JPRS-UST-86-008

27 February 1986

USSR Report

SCIENCE AND TECHNOLOGY POLICY

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-UST-86-008

27 February 1986

USSR REPORT

Science and Technology Policy

Contents

ORGANIZATION, PLANNING AND COORDINATION

LEGAL ASPECTS OF FORMULATING COMPREHENSIVE GOAL PROGRAMS

Moscow KHOZYAYSTVO I PRAVO in Russian No 8, Aug 85 pp 13-16

[Article by doctor of juridical sciences I. Bachilo, senior scientific associate of the Institute of State and Law of the USSR Academy of Sciences, and Doctor of Juridical Sciences Z. Krylova, professor of the Moscow Institute of the National Economy imeni G. V. Plekhanov: "The Legal Support of Comprehensive Goal Programs"; passages rendered in all capital letters printed in boldface in source]

[Text] The Goal Is Introduction in Production

In conformity with the policy of the intensification of social production, which was elaborated by the CPSU, the scale of the use in the national economy of the achievements of science is increasing substantially. At the April (1985) CPSU Central Committee Plenum, in particular, it was emphasized: "As the main lever of the intensification of the national economy and the better use of the gained potential the party is bringing to the forefront the cardinal acceleration of scientific and technical progress." The extensive introduction in the national economy of the goal program method of planning and management is contributing to this. It is a form of the cooperation of scientific institutions, design organizations and production associations, which should design, prepare for production and insure the output of new machines or mechanisms. The program can be planned within a single ministry (intrasectorial) or a number of ministries (intersectorial).

The implementation of the scientific and technical comprehensive goal program of the development and introduction of industrial robots, manipulators and robotic complexes in the system of the Ministry of Instrument Making, Automation Equipment and Control Systems can serve as an example of the great efficiency of activity of this sort. The complexity of the task and the large number of performers require the establishment of a system of the management of this program. Its ultimate goal is the robotization of production in the system of the Ministry of Instrument Making, Automation Equipment and Control Systems, as well as the introduction of microprocessors, robots and flexible automated devices in other sectors of industry. A peculiarity of the program consists in the fact that, in addition to the all-union industrial association which is performing this work as the main organ, territorial centers of

robotization are in operation throughout the sector. The program is being successfully developed and is yielding positive results.

For several years now the Minsk Machine Tool Building Production Association imeni S. M. Kirov has been putting into practice an alliance with science, using comprehensive goal programs. The retooling of production on the basis of the introduction of manipulators, robotic complexes and other types of new equipment is the result of the implementation of just one of them. The Robotics Center, which was established by the Institute of Physics of the Latvian SSR Academy of Sciences in 1981, is insuring the introduction of technical innovations primarily in the machine building sectors. The center is cooperating with many enterprises, associations and scientific research institutes. The corresponding comprehensive goal program made it possible to establish well the organizational and economic relations of the partners.

The Management of the Program

The extension of the goal program method of planning is envisaged by decisions of the party and government. Under the new conditions new forms of management are also required. For the present the management of comprehensive goal programs of sectors is carried out by the staff of the ministries. However, this staff at present is not fully prepared for the new method of the mobilization of organizational resources and does not have the proper legal support and standard regulation. In the statutes on the administrations, divisions and inspectorates of the majority of ministries the tasks on the use of this method are not specified, the functions, rights and duties of the subdivisions and officials with respect to the management of comprehensive goal programs are not regulated, the responsibility of the performers is not established.

The establishment of a system of goal management, which will enable a single "manager" to supervise all the progress of the implementation of the program, is needed. In the absence of centralized supervision duplication and the lack of coordination in the activity of individual units inevitably arise.

The farms of the system of the USSR Ministry of Agriculture ordered from the enterprises and scientific production associations of the system of the Ministry of Instrument Making, Automation Equipment and Control Systems the production of a series of new measuring instruments. Contracts were concluded with the immediate producers for the scientific design development and series production of the items. Subsequently it was necessary to make many adjustments in the contracts, to eliminate the duplication of scientific design developments and to introduce special forms of mutual information. As a result a large amount of unnecessary efforts and working time were spent, extensive correspondence was carried out. It would have been possible to avoid all this, if the goal management of the scientific and technical program had been used.

Here is another example: the Tselinogradselmash Production Association needed 3 years for the development of the design of a wide cultivator and a whole 7 years for its placement into production. To a considerable degree this occurred because for the obtaining of permission for the output of the item at

the association they had to "gather" more than 100 official stamps and to submit the question for approval to many instances. And it turned out: they produced the machine, but it was already obsolete.

For the assurance of the efficient management of a program it is necessary to seek the most effective methods of supervision, which would make it possible to combine together the efforts of many subdivisions.

Methods of improving the management of scientific and technical comprehensive goal programs are being elaborated in order to avoid the dragging out of the development, production and introduction of new equipment in case of a large number of participants in this process. On the orders of the Ministry of Instrument Making, Automation Equipment and Control Systems procedural recommendations on the establishment of organizational and legal support of the system of the goal management of the program were drawn up by a creative collective of scientists of the Institute of the National Economy imeni G. V. Plekhanov, the Institute of State and Law of the USSR Academy of Sciences and other scientific organizations.

Here this system is represented as a special temporary apparatus which operates within the sector. Depending on the scale of the program a supervisor, who carries out the administrative and scientific supervision of the formulation and implementation of the program and the coordination of the activity of all the coperformers who are participating in the development of new equipment, is appointed from among the leading specialists of the sector; the main scientific and technical organization, which is responsible for the formulation of the program and unites around itself the scientific and technical coperforming organizations, is specified. The scientific supervisor, who is usually in charge of the main organization, is also appointed. He carries out the general supervision of the formulation of the program, insures its high technical level, the coordination of research and experimental design work and the monitoring of its quality and timely performance, organizes if necessary scientific research, takes part in the work of the commission for the acceptance of prototypes of items and so forth. The main specialists, who take part in the formulation and implementation of the program, are appointed, they can make up an extensive group of workers of various types: the main ones are the designer, the process engineer, the economist, the chemist, the physicist, the production manager and others.

The supervisor, his deputies and the main specialists make up the group of the management of the program. They are on the staffs of their own organizations, but engage in the formulation and implementation of the program. Along with the management group the responsible performers of the assignments and stages of the fulfillment of the program, the coperformers and the developers work.

The interconnection of the group of the management of the program and the linear functional system of the ministry is accomplished by the interprogram coordinating center of the planning and management of the comprehensive goal program and the scientific and technical center of the sector.

The Legal Support of the System

At present the activity of the special apparatus of the goal management of programs is regulated by uncoordinated acts, which do not properly regulate the functions of all its units. The Temporary Statute on the Main Supervisor of the Program, which was approved by a decree of the USSR State Committee for Science and Technology, the USSR State Planning Committee and the Presidium of the USSR Academy of Sciences in November 1980, is in effect. It specifies in general terms the functions of the supervisor and binds him to the formation of individual organs. The formulated procedural recommendations for the Ministry of Instrument Making, Automation Equipment and Control Systems envisage their legal support. Moreover, taking into account the practical experience of the functioning of the program in the sector, they also plan the formation of other organs, including the scientific and technical council of the program, and specify the functions of the main organization, the management group and the responsible performers. All these organs should receive a full legal status and should operate within specific rules and regulations, which insure their effective operation.

The Statute on the Procedure of the Formulation of All-Union, Republic (Interrepublic), Sectorial (Intersectorial) Scientific and Technical Programs and Scientific and Technical Programs of Regions and Territorial Production Complexes, the Implementation of These Programs and the Monitoring of Their Fulfillment was approved by Decree No 130/68 of the USSR State Committee for Science and Technology, the USSR State Planning Committee, the Presidium of the USSR Academy of Sciences, the USSR State Committee for Material and Technical Supply, the USSR State Committee for Construction Affairs, the USSR Ministry of Finance and the USSR Central Statistical Administration of 30 March 1984.

With allowance made for the experience of introducing procedural recommendations in the system of the Ministry of Instrument Making, Automation Equipment and Control Systems it is possible to distinguish three basic directions of the legal support of the management of specific programs in the sectors of the national economy. These are the procedure of their formulation and implementation; the internal structure of management; the interaction of sectorial subdivisions in the process of the formulation and implementation of the program.

It seems that the order on the organization of the formulation and implementation of the sectorial program should be the initial document. Its preparation begins, as a rule, only after the discussion and approval of the forecasting and program studies. The approximate form of such an order has been developed.

Here the basic characteristics of the program, the name and the number, the time of formulation and implementation, a brief identification of the goals, the composition of the subprograms and the criteria of the evaluation of efficiency are envisaged; the supervisor of the program, the main scientific and technical organization, the scientific supervisor and the main specialists are approved; the sources of resource supply, the procedure of planning and

financing, the time of the formulation of the program and its stages and the procedure of the acceptance and the monitoring of the entire course of the work are specified. The possibility of the promulgation of several orders, which supplement the initial order (on the approval of the sections of the program, on the appointment of additional coperformers, with respect to the results of the check and so forth), is allowed. During the term of effect of the program certificates, which reflect its various stages, for example, on the completion of scientific research and experimental design work and the start of the industrial production of one item or another, are also issued.

Drafts of the statutes on the supervisor of the program, the scientific supervisor and the chief designer are offered in the recommendations. Thus, in the Statute on the Supervisor of the Program it is proposed to specify his functions.

AT THE STAGE OF THE FORMATION of the sectorial program of the development of new equipment the supervisor on the basis of the order jointly with the scientific supervisor, the chief specialists and the responsible performers, basing himself on the linear functional administrations, specifies in detail the goals and tasks of the program and insures the drafting of network schedules and plans of its implementation. He organizes and monitors the inclusion in the plans of the economic and social development of the sector of all the indicators which are necessary for the implementation of the program; the items on scientific research and experimental design development, capital investments, material and technical supply, finances, production, implementation, labor and wages, the production cost, the profit and the profitability, labor productivity, economic stimulation and efficiency; approves the measures which are necessary for the formulation of the program; determines the assignments for specific organizations and persons who are taking part in its formulation; appoints the performers; insures the high-quality study of the drafts of the programs, subprograms, plans and network schedules, the introduction of all types of resources, the inclusion of the corresponding items in the plans of the performing organizations; determines the expenditures and resources and draws up the supply orders.

AT THE STAGE OF FORMULATION the supervisor of the program:

--carries out the day-to-day checking of the progress of the fulfillment of the detailed plans of research, development, the assimilation of new technological processes and the organization of the series (mass) production of new products;

--supplies the operations with material, technical, manpower and other resources and monitors their proper use;

--monitors the timely acceptance and transfer for practical use of the results of the performed research;

--insures the financing of operations within the limits of the allocated monetary resources.

AT THE STAGE OF PRODUCTION the supervisor of the program:.pa

--insures fulfillment in the set time and within the limits of the allocated finances the assimilation and the output of the prototype of the product;

--insures the timely preparation of production capacities for the output of the new product;

--submits to the superior organ documents which certify the fulfillment of the program.

It seems advisable to draft a general enforceable enactment--the Statute on the Comprehensive Goal Program, in which the functions, rights and duties and responsibility of its supervisors of all levels should be regulated. It is necessary to insure in a standard manner their interaction both in the special structure of management and in external units.

Individual job instructions for the workers of ministries, who are employed in the system of program management, should also be drafted. Here it is possible to use the Basic Procedural Regulations on the Formulation of National Economic Comprehensive Goal Programs, which were approved by Decree No 117 of the USSR State Planning Committee of 3 June 1980.[1]

The activity of interprogram coordinating organs both within the sector and outside it also needs legal regulation. This will be of great importance for the development and the broadening of the sphere of use of comprehensive goal programs.

It seems that the legal aspect of the question should be taken into account when preparing the new edition of the General Statute on USSR Ministries, as well as other all-union and republic acts which concern the organization of production management.

FOOTNOTE

1. BYULLETEN NORMATIVNYKH AKTOV MINISTERSTV I VEDOMSTV SSSR, No 9, 1981, p 22.

7807
CSO: 1814/23

INDEPENDENCE OF MANAGERS OF RESEARCH, DESIGN ORGANIZATIONS

Moscow IZVESTIYA in Russian 8 Sep 85 p 2

[Article by Doctor of Technical Sciences G. Karyuk and Candidate of Economic Sciences V. Chirkov (Kiev): "Independence: For What It Is to Be Used"]

[Text] Much is being written about the broadening of the rights of managers of enterprises and scientific organizations. But this theme has not yet been exhausted. It is too important and the forces of inertia, which will have to be overcome, are too great to renounce the customary notion of the irreplacability of rigid standards and petty instructions from above. We will show what this habit leads to on the basis of the example of the Special Design and Technological Bureau (OKTB) of the Institute of Problems of Material Science of the Ukrainian SSR Academy of Sciences, which we represent.

A new complex is being built for the institute. It has been under construction for a long time--6 years. The detail design contains a detailed description of the future experimental output of the complex, the composition of the stock of equipment, and the technology which is described in every detail. The technical inspectorate is keeping a strict watch over the observance of the design. "And still there are such organizations," the technical inspector once complained to us, "which 1-1.5 years after the placement of the project into operation contrived to revise the content of its activity in violation of the detail design. We punish such violators of state discipline." But we say nothing and think to ourselves that we will change our detail design of the complex without fail even earlier--half a year before its placement into operation. Why? Because several years ago, when preparing the detail design with allowance made for the production of items from the same materials, we did not know that the staff members of our institute would succeed in developing a more advanced material.

We are not against detail designs of pilot works. But they should be drawn up in general form, in accordance with the basic indicators and as multivariant ones, which make it possible to revise them already at the stage of the construction of the project, so that it would not become obsolete by the time of placement into operation.

When designing a pilot plant for powder metallurgy we were confronted with another absurdity. The planning organization proposed to us to incorporate in

the design the norms which are in effect for large-series and mass works in the sectors of industry.

To our amazement, it turned out that there are no standards at all as applied to pilot enterprises and design bureaus. It is not difficult to imagine to what all this leads: with the first days of work the collective of the pilot plant becomes interested in the stabilization of the range of products and in the increase of its series nature. Instead of developing the technology of the production of new products and quickly and frequently changing over experimental production, the pilot plant was forced to pursue the volume indicators and formal profitability. In practice such "concern" about the policy of economy and about the maximum use of the capacities of the pilot plant will turn for the national economy into enormous losses, since the middle link--"technology"--which is called upon to embody scientific ideas "in metal," in practice will fall out of the "science--technology--production" cycle.

As is known, monotony is incompatible with art. That is why every movie is made by a filming crew which has been specially made up for that. When the shootings have been completed, the joint work of the members of the temporary collective is also completed. Then there is again the "reshuffling" of personnel on the treshhold of the production of a new picture: the selection of precisely such workers and in such a combination of them takes place in order to successfully solve the creative problem.

But genuine science also does not tolerate monotony and a stock phrase (standards are attributes of series production). And the question arises: Why do scientific institutions and design and technological organizations not adopt the know-how of the same movie studios?

Back in the early 1970's our institute received the assignment to quickly develop and assimilate the technology of the production of fiber on the basis of silicon carbide. The planning calculations showed that the scientific reserve and the production capacities make it possible to fulfill the assignment in 2 years. But in fact the assignment was fulfilled in half a year. The establishment of a temporary collective of process engineers, chemists, and designers, who were aimed at the solution of a single problem, helped to speed up by fourfold the fulfillment of the set of operations.

The first independent experiment proved to be reassuring, and soon a second multiple-skill special-purpose group of staff members, who specialized in the area of refractory compounds, was set up. The path from the scientific idea to the commercial implementation of the results of the research took 1.5 years and was crowned by the development of the new highly efficient tool material hexanite-R, which has received the extensive recognition of machine builders. However, these temporary collectives and the ones similar to them were unofficial, were set up, in essence, in violation of the approved manning tables, and evoked the reproaches of inspectors.

The time came to grant the managers of scientific research institutes and design bureaus by way of directive much independence in the formation of the structure of their organizations. They should have the legal opportunities to

establish at their own discretion temporary multiple-skill special-purpose subdivisions and to provide them with the appropriate material working conditions.

It will be possible to realize completely the advantages of temporary multiple-skill special-purpose collectives, if the manning tables, which today require the unconditional observance of the standards of the size of the categories of workers, become more flexible. For example, the division should consist of at least 25 people, while the sector should consist of 8 people. There should be nine rank and file engineers per leading engineer. But what is happening? The collective of a leading division during the competition decided to fulfill the set amount of work with a smaller number, having reduced the number of its staff members, say, from 27 to 23. This commendable initiative will have the result for the division that it will in accordance with the staff standards be transferred to the rank of a sector with the corresponding demotions and decrease in the salaries of the managers of the division and sectors. There is another example: at a design bureau they decided to hire a highly skilled specialist for the position of leading engineer, but for this it is necessary in accordance with the standard to hire another nine rank and file engineers. Since the total number of workers is limited, the possibility of hiring a valuable specialist disappears.

The argument: the violation of staff standards will have the result that all engineers with time will become leading engineers, and they will have no one to lead, can be opposed to such criticism. But it is possible not to be afraid of extremes and exaggerations, if the managers of institutes and design bureaus are left to differentiate themselves the positions within the limits of the wage fund. While it is necessary to match the fund itself with the amount of scientific and technical output of the given quality.

The granting to scientific organizations and pilot works of extensive independence in the management of their own activity will remain a declaration, if it is not backed by a material base. The question of supplying science with resources is being settled very slowly. Only a negligible portion of the needs of scientific organizations are being met by centralized supply. It is necessary to "get" the remaining materials and equipment, using for this purpose the practice of concluding economic contracts, which are inefficient, but then are provided with materials!

Innovations are expected from science. But there are no finds without research. Research is accompanied by material expenditures. The organs of material and technical supply must understand and accept this logic. Scientific research institutes and design bureaus should have reserves for unexpected orders and have interdepartmental enterprises for the prompt production of scientific apparatus and nonstandard equipment.

In trying to persuade ourselves and others of the need to grant greater independence to scientific institutions, design bureaus, and pilot plants, we are pondering more and more why, strictly speaking, independence is needed and at what it will be aimed. At first glance the question seems naive. Well, of course, in order to obtain good results. But then a second question suggests itself: Good for whom? Last year the output of the latest material for the

production of important items of machine building production was assimilated at our special design and technological bureau. We sensed a profound moral satisfaction from participation in the solution of a difficult technical problem. They praised us. But the actual level of the quarterly bonus decreased from 40 to 27 percent. The staff members of the special design and technological bureau were hurt materially for the displayed initiative and the risk which justified itself. Why? Because the proportion of labor expenditures in the structure of the product cost increased, it was necessary to purchase new expensive equipment, to reequip the shops, and to instruct the workers in the new technology.

So it turns out that it is not always profitable for the pilot plant or design bureau to produce what is unquestionably profitable for the state. And one must not disregard this discrepancy when it is necessary to settle the fundamental question: Is one to rely or not to rely on the further development of cost accounting in the sphere of science and scientific service as an important lever of the acceleration of scientific and technical progress?

Of course, there is no limit to the development of cost accounting as a set of economic methods of the management of the economy. It is also useful to improve cost accounting in the sphere of science. But if in industry cost accounting is now regarded as one of the basic economic factors of the intensification of production, should it, perhaps, in the sphere of science play an auxilliary role? For the main thing for science is the achievement of the end national economic results.

Our days are a time of the increase of the social recognition of scientific and engineering labor. A pronounced orientation of design and technological organizations and pilot experimental plants toward the ultimate goals of their activity will also promote this. Then the great independence, which is being granted to them, will be used properly.

7807
CSO: 1814/32

ORGANIZATIONAL, PLANNING AND COORDINATION

CONCEPT, FACTORS OF ACCELERATION OF S&T PROGRESS EXAMINED

Moscow EKONOMICHESKIYE NAUKI in Russian No 9, Sep 85 pp 3-9

[Article by candidate of economic sciences, docent K. Ulybin: "The Cardinal Acceleration of Scientific and Technical Progress Is a Task of Vital Importance"]

[Text] Our party has always assigned to scientific and technical progress an important role in the solution of various national economic problems. But at present scientific and technical progress, as was emphasized at the conference in the CPSU Central Committee, which was held in June 1985, is acquiring a special, it can be said, vital role. Scientific and technical progress should become the basis of the acceleration of the socioeconomic development of our country.[1]

Our society stands today on the threshold of the accomplishment of profound transformations in practically all spheres and areas. The CPSU has adopted a policy of the achievement of a significantly higher qualitative level of the development of the economy than we now have. In the next few years a sharp turn of the economy in the direction of intensification has to be accomplished, profound structural changes have to be achieved, labor productivity and the efficiency of the use of all resources have to be increased substantially, the well-being of the people has to be increased. It is planned as a result to speed up drastically the development of the USSR national economy and to bring it up to the highest levels in the world. The tasks of a fundamentally new scale and importance, which were posed by the CPSU, can be successfully accomplished only on the basis of scientific and technical progress by the universal, extensive and skillful use in production of its best achievements. Scientific and technical progress is capable of increasing greatly the productive force of man. Modern equipment can transform qualitatively the labor of people and make it more interesting, meaningful and creative. It makes it possible to change production over quickly to the output of new products and provides a high output-capital ratio by means of automatic modes of the operation of equipment.

In speaking about the increased role of scientific and technical progress, one should emphasize the particular importance of reorganization and the reorientation toward its new levels precisely at present, when the drafting of the Basic Directions of the Economic and Social Development of the Country for

the 12th Five-Year Plan and to 2000 is being completed. The plans now being drawn up will in many ways determine the future of our society. Therefore, new approaches, which insure a sharp turn toward the intensification of the economy, should be incorporated in them. The requirements of the acceleration of scientific and technical progress should find full reflection in the plan assignments which are being elaborated at all the levels of management. Each production collective should enter the new five-year plan with a precise and effective program of scientific and technical transformations.

It is appropriate, it seems, also to note that it would hardly be correct to reduce the essence of the changes being planned in the sphere of scientific and technical progress to the overcoming of some oversights or others in this area or to the more complete use of the available resources. All this, of course, is necessary, but is already inadequate. The concept of the acceleration of the socioeconomic development of the country, which was advanced by the CPSU, requires much more. It dictates the need, as was noted at the April (1985) CPSU Central Committee Plenum, for the cardinal acceleration of scientific and technical progress and its bringing up to a qualitatively new level of development.[2]

In light of the conference held in the CPSU Central Committee let us turn to the specific problems of the acceleration of scientific and technical progress, which require immediate solution.

The human factor, as Comrade M. S. Gorbachev noted at the conference in the CPSU Central Committee, is a decisive factor of all changes. It is well known that the better and more thoroughly workers understand the essence of one process or another, the more completely its implementation in practice is insured. This general rule also applies to scientific and technical progress.

If we look at economic practice from this standpoint, it is possible to note that a considerable number of workers understand in a simplified way the content of modern scientific and technical progress. The concept of scientific and technical progress is frequently applied only to the sphere of the technical equipment of production, mainly basic production. It encompasses to a much smaller degree the other aspects of production: its organization and management, service and repair, procurement, tool, transportation and warehousing services. And the fact that the requirements of scientific and technical progress are not being properly applied to the output being produced, is absolutely intolerable. At a number of enterprises their updating, the improvement of the structure and the increase of quality are not at the center of attention and are taking place slowly. Very often scientific and technical progress reduces to the use of technical innovations which do not bring about substantial changes in production. Therefore, the introduction of so-called new equipment far from always provides an appreciable increase of efficiency, while the "new product," which is being produced, with respect to its main parameters does not prove to be substantially better than the former product. Moreover, frequently the measures on the introduction of the achievements of scientific and technical progress are still carried out sporadically, while their implementation drags on for long years.

It is obvious that such an understanding of scientific and technical progress poorly reflects its present requirements and cannot serve as a reliable basis for the elaboration of effective economic decisions. Therefore, it is necessary "to achieve a change in the minds and moods of personnel from top to bottom, having focused attention on the most important thing--scientific and technical progress."[3]

Scientific and technical progress is a broad and extensive concept, which has many facets and aspects. But its essence at present appears first of all in the need for the accomplishment of profound qualitative changes in all spheres and units of production as a result of the rapid and universal introduction in it of the latest and most effective achievements of science and technology. The new qualitative nature of these changes consists in the fact that they should insure the substantial increase of production efficiency, should enrich the labor of people, should change its conditions for the better and should be conducive to the output in sufficient quantities of the products, which society needs and the quality of which would conform to the best world models.[4]

Scientific and technical progress presumes the thorough integration of science with production and the extensive use in practice of the leading achievements of creative thought. Production under the conditions of the scientific and technical revolution is ceasing to be only a proving ground for the testing of the best scientific ideas. It is becoming the main sphere of their quick use. Genuine scientific and technical progress encompasses all production as a whole, all its aspects and units, starting with the technical equipment of production and ending with organization, management, the training of personnel and the output of products. It is a constant, continuous and limitless process. Hence it follows that the maximum impact from scientific and technical progress can be obtained only in case of a comprehensive approach to its implementation.

The changeover of the process of the reproduction of fixed production capital to the path of scientific and technical progress is especially important for the successful development of the national economy. At present the implementation of the simple reproduction of capital primarily not by means of its updating and replacement by new, more advanced capital by renovation and retooling, but by means of the lengthening of the life of machines and equipment through capital repair is a significant shortcoming of this process. This means was justified during the period, when the service life of equipment was longer and it was less susceptible to obsolescence, since the pace of scientific and technical progress was not that fast.

The current scientific and technical revolution has sped up substantially the obsolescence of equipment. However, this circumstance is frequently underestimated. Frequently owing to inertia the assets, which are intended for the reproduction of capital, for the most part are still being channeled into the capital repair of equipment, instead of using them for the purchase of more productive equipment. Especially as it is more convenient to "mend" operating equipment than to replace it with new equipment: it is not necessary to overhaul the technology, to change the established organization of production and so forth. For society such an approach to the reproduction

of fixed capital turns into losses which are hard to make up. The expenditures on repair during the service life of many machines usually exceed by two- to threefold, and at times fourfold their initial value. Moreover, capital repair is inefficient, since the productivity of repaired equipment, as a rule, decreases. Today it is also especially important to consider that the labor productivity of skilled repairmen is one-sixth to one-fourth as great as that of workers who are engaged in the production of new machines.[5] Moreover, manual types of labor predominate in repair operations. Hence it follows that from both a social and an economic standpoint it is now extremely important to reject the former priorities in the sphere of the reproduction of capital and to take the path of the continuous technical updating of production. The retooling of operating enterprises, which, as a rule, is much more effective than new construction, is an important direction of such updating. The expenditures on renovation, for example, are recovered threefold more rapidly than new construction, here the output-capital ratio as a result of renovation increases.

The change of the approach to reproduction policy should be supported by the corresponding planning levers. In our opinion, the proportion of the capital investments, which are being channeled into renovation, should be established for enterprises as a mandatory standard. It should be not less than 50 percent of their total amount. The corresponding standards for the replacement and retirement of capital should also be elaborated. Apparently, it is advisable with respect to many types of machinery and equipment to increase the rate of amortization and to leave at the disposal of associations and enterprises the assets which are intended for the simple reproduction of capital.

The fee for productive capital should play a more active role in the updating of production. Its amount comes most often to 6 percent and does not change over the entire service life of machines and equipment. As a result new equipment from the standpoint of the fee for capital does not have priority as compared with all the equipment. The proposal to increase the rate of the fee for capital by several percent after each 5 years of service of the equipment, in our opinion, merits attention.[6] Such a step, having made the use of old equipment less profitable, will stimulate the use of new machines and will contribute to the rapid updating of production.

The fundamental technical updating of the production system is impossible without significant changes of the sectorial structure of the national economy, and first of all without the leading development of machine building. Just the increase of the growth rate of production by 1.5- to 2-fold and the increase of the quality of the products of the sector will make it possible to expand significantly the production of new machinery and equipment and to insure the more rapid replacement of productive capital. In this connection the question of the quality of new equipment and of its conformity to the requirements of scientific and technical progress is especially urgent. "Not any updating of production, but only such updating, which is accompanied by the introduction of the most advanced equipment and yields the greatest economic and social impact,"[7] is needed today.

In this connection the question of the socioeconomic criteria of the efficiency of new equipment is assuming particular urgency. So far the necessary definiteness has not been achieved in its solution, which is undoubtedly affecting the development, production and introduction of new equipment.

Diverse demands, which stem from the current scientific and technical revolution, are now being made on new equipment and technology: reliability and dependability, which make it possible to decrease the outlays on maintenance and repair and to eliminate the losses from the forced idle times of machines; universality and the capacity for rapid readjustment; economy, which finds expression in the decrease of the expenditures per unit of the effective impact, in the decrease of the cost of the output being produced, in the economy and saving of material and manpower resources. The importance of the social demands on new equipment is also increasing: it should enrich the labor of workers, should contribute to the development of its creative nature, should make working conditions easier, should not upset the ecological equilibrium and others. The most important characteristic of new equipment is its productivity. However, as practical experience shows, a significant portion of the new equipment now being produced in its parameters is only 25-30 percent more productive than the preceding analogues.[8] Equipment with such a reserve of efficiency, as a rule, becomes obsolete, without managing to get to the conveyor.

The orientation of the producers of new equipment not toward the development of promising technical systems of new generations, but toward the improvement of traditional technologies and machines, which inevitably dooms production to technical backwardness, is also one of the causes of the low efficiency of new equipment.

As the experience of the leading production associations teaches, in order to keep pace with the requirements of life, today it is necessary to emulate tomorrow and even the day after tomorrow. "...Priority should be given to fundamentally new, truly revolutionary solutions which are capable of increasing greatly labor productivity."[9]

The assurance of the necessary level of efficiency of new machines should become one of the main standards for their developers. A thorough economic analysis, which envisages its achievement, is now becoming one of the starting points in the solution of all the technical and production economics problems, which are connected with the designing, production and introduction of new equipment. The careful study of the question of efficiency at the stages of the designing and planning of some processes or others, in which the foundations of future production are incorporated, is especially important. In the opinion of specialists, 75-80 percent of the efficiency of equipment, which is being newly produced, is determined in the process of its designing. The careful economic substantiation of the plans of the distribution of production, as well as of the construction of enterprises and other facilities yields a large impact. Here at times additional expenditures of several thousand rubles on the elaboration of different versions and their comparison turn into a saving of tens of millions of rubles in the process of the building and operation of facilities. Therefore, the strict limiting of the

assets for the substantiation of plans, which happens in practice, is hardly justified.

The time factor has a direct bearing on the acceleration of scientific and technical progress. At present the most promising ideas, as a rule, tend to quickly lose their novelty. According to the estimates of experts, today inventions more than 7 years old are usually obsolete.[10] Therefore, the quickest introduction of new ideas, developments and equipment in production is an issue of vital importance. In the economy gained time means saved resources, the better meeting of needs and the more rapid development of production. According to estimates, the decrease of the average period of construction by 40 percent would make it possible to increase the annual growth rate of the national income by 0.5 percent and more.[11] The reduction of the actual time of the development and output of new equipment to the optimum time might yield, perhaps, an even greater impact. The establishment of scientifically sound periods of the accomplishment of the corresponding work, with allowance made for advanced domestic and foreign experience, and the strict monitoring of their observance, which is supplemented by an effective system of the material stimulation of the developers of new equipment, are necessary for this.

One should also approach in much the same way the placement of new equipment and products into mass production. A delay with the assimilation of the production of new items turns for the national economy into large losses, hinders the accomplishment of technical progress and becomes a cause of the aging of the production system. In a number of machine building ministries slowness with the assimilation of new types of items is leading to an increase of the proportion of products which have been produced for more than 10 years,[12] that is, obsolete products.

The establishment of the corresponding standard base of the process of the updating and modernization of equipment and the products being produced is envisaged for overcoming the lag in this area. Starting in 1986 special assignments on the development and production of new types of machines will be established for ministries and associations, and the amounts of obsolete products, which are being removed from production, will also be specified.[13]

The acceleration of scientific and technical progress requires the substantial stimulation of all the spheres of science, and first of all sectorial science. The complaints being lodged against the latter are entirely valid. Much research and development of sectorial scientific research institutes and design organizations are unpromising. On the other hand, promising, so-called protectable (based on registered discoveries and inventions) themes hold a modest place in the plans--their proportion rarely exceeds a third of the research.[14]

The reasons for the formed situation to a considerable extent consist in the fact that the necessary attention is not always being devoted to the elaboration of truly promising scientific ideas and the appropriate support is not always being provided. The securing of planning, financial and material priority for the development of fundamentally new, highly efficient types of equipment is a task of vital importance.

It is important already at the stage of planning to form the structure of the research and development being performed so that it would be aimed at the acceleration of scientific and technical progress. Promising, protectable themes should hold a dominate place in the plans of scientific research and design organizations. It seems advisable already before drawing up the plan to approve for these organizations the structural network of the basic operations with the specification of their importance. The share of the themes, which should be based on discoveries (let us assume 30-40 percent) and on inventions (45-50 percent), should be stipulated.

According to the estimates of specialists, for the assurance of the annual increase of labor productivity in the national economy by 5 percent it is necessary that new equipment would be not less than 1.6-fold more productive than the former equipment, while its cost should be not less than 40 percent less.[15] On the basis of these estimates, in our opinion, a kind of lower limit of the level of efficiency of new equipment should be established. If the anticipated impact from a new thing does not keep within these limits, it does not have the right to production.

The scientific potential of the higher educational institutions of the country contains large reserves of the acceleration of scientific and technical progress. The volume of scientific developments of higher educational institutions for the national economy, according to the estimates of specialists, can be increased by 2- to 2.5-fold. Extensive elbowroom for the activity of economics scholars exist in this important matter. It is appropriate to note that scientific and technical progress for the present has a weak effect on the sphere of the organization of labor and production, as well as their management. The need for the thorough scientific study of these questions and for the corresponding recommendations is great.

The cardinal acceleration of scientific and technical progress requires "the thorough reorganization of the system of planning and management, the entire economic mechanism."[16] It is impossible to accomplish the posed tasks in the area of scientific and technical progress only by having taken a number of additional steps on the improvement of its management. Of course, such steps are necessary. But they are capable of yielding the necessary impact only by having been incorporated in the new economic mechanism of the intensive type.[17] What are the basic, in our opinion, specific aspects of the improvement of the management of scientific and technical progress?

At present at associations and enterprises the plans on new equipment are one of the main levers of the influencing of scientific and technical progress. Unfortunately, it is insufficiently effective. The main reason for this is seen at times in the lack of the proper responsibility of production collectives and the corresponding workers and in their lack of interest in the fulfillment of the plans of scientific and technical progress. Whereas the upsetting of the production plan entails strict administrative and appreciable material sanctions, the nonfulfillment of the plan on new equipment at worst leads to the decrease of the special fund, which is practically not felt by the collective. Of course, the degree of responsibility and the effectiveness of the stimuli for the fulfillment by enterprises of the plans on new equipment should be increased, which, in particular, is envisaged by the

conditions of the large-scale economic experiment which is being conducted in the national economy. Thus, a bonus in the amount of up to 3 salaries is established for highly efficient activity on the introduction of new equipment, while in case of the nonfulfillment of the assignments on new equipment the bonuses for management personnel for the basic results of economic activity are reduced by not less than 25 percent.

However, these steps, in our opinion, are not enough to change radically the attitude of production workers toward scientific and technical progress. As practical experience shows, the increase of responsibility, which is not backed by production necessity itself, does not solve the problem completely. As long as there is no direct and close connection between the plan on new equipment and the production plan and as long as enterprises have the opportunity to fulfill successfully a production program, which does not reflect the requirements of scientific and technical progress and does not depend on the technical state of production, radical changes in the attitude toward scientific and technical progress cannot occur. Therefore, it is necessary for the plan of the output of products by enterprises to be formed on the basis of scientific and technical progress. It should envisage, first, the rapid updating of products; second, the output of items which correspond to the highest world standards; third, the highly efficient use of resources; fourth, the decrease of the expenditures of manual labor and a high level of mechanization. The fulfillment of these conditions will require the adoption and implementation of a comprehensive and intense program of the scientific and technical updating of production. The activity of many leading associations and enterprises confirms the correctness of such an approach.

The assignments on new equipment should be directly linked with all the sections of the plan of the enterprise, and first of all with the plan of capital investments. It is now already insufficient to allocate 12-15 percent of the capital investments for measures on scientific and technical progress, as is occurring at many enterprises. It is also necessary for the increasing capital investments, which are being allocated for the goals of the scientific and technical development of production, to be backed by the necessary material and manpower resources.

The acceleration of scientific and technical progress directly depends on the development of cost accounting of enterprises. The poor return on the assets, which are allocated for the technical development of production, in many ways is explained by the fact that enterprises receive them through centralized capital investments, as if free of charge. This frequently gives rise to dependency aspirations and the desire to receive more assets and cultivates an irresponsible attitude toward their use. The development of the full cost accounting of enterprises presumes that they should themselves "earn" the assets for their own development. Precisely such an approach to the formation of the sources of the financing of the technical updating of production is envisaged by the large-scale economic experiment now being conducted.[18] For this purpose a production development fund, the amount of which depends on the quality of the work of the enterprise, is being formed at enterprises by means of deductions from the profit and amortization. For example, at the enterprises of the ministries of the electrical equipment industry and heavy

and transport machine building the overwhelming portion of the assets for retooling (70-90 percent) is formed by means of this fund.[19]

Cost accounting should also be aimed at the more complete use of the achievements of scientific and technical progress. Today complex technical systems are entering production. The expenditures on their acquisition frequently come to hundreds of thousands and millions of rubles. Expensive equipment requires a new attitude toward their use. In order to achieve great efficiency, it is necessary to insure its intensive utilization and a tight operating schedule and to increase the machine shift coefficient. Practical experience provides many examples of when only a fourth of the potential of computers is used, robotics, automated sections and powerful tractors and vehicles are used not at full capacity. The losses, which society bears due to such an attitude toward the use of equipment, are very appreciable. In individual cases the saving of living labor, which the use of new equipment provides, is exceeded by 1.5- to 2-fold by the decrease of the output-capital ratio.[20] All this checks the process of the intensification of the national economy and frequently brings to naught the increase of efficiency in other sections of production.

Such a cost accounting lever as the fee for capital should have a more active influence on the efficiency of the use of machinery and equipment. It is impossible to recognize its existing amount as satisfactory. In our opinion, it does not conform to the real economic role of fixed production capital in the overall system of factors of efficiency. It seems that the fee for capital should be increased to 10-12 percent and, as was noted above, should vary depending on the service life of the equipment. Such a step in turn would lead to a decrease of the proportion of the net surplus of the profit, which is transferred to the budget. This payment, as is known, in practice does not bear a cost accounting load. The fee for capital would affect more appreciably the cost accounting interests of enterprises and would stimulate the more efficient use of the production potential.

The acceleration of scientific and technical progress is directly connected with the need for the formation among personnel of modern economic thinking.[21] And this is natural. People develop science and technology. The acceleration of scientific and technical progress requires of man not only thorough and extensive knowledge, but also a bold, truly innovative attitude toward any matter and the ability to approach it from a new, unexpected angle and requires initiative, flexibility, dynamicness and the ability to adopt a new approach quickly and in good time in conformity with the new requirements of the times. The instructors of economic subjects of the higher school are also called upon to participate more actively in the formation of these important qualities of the personality of future specialists.

FOOTNOTES

1. See M. S. Gorbachev, "Korennoy vopros ekonomicheskoy politiki partii. Doklad na soveshchanii v TsK KPSS no voprosam uskoreniya nauchno-tekhnicheskogo progressa 11 iyunya 1985 goda" [A Vital Issue of Party Economic Policy. Report at the Conference in the CPSU Central Committee

on Questions of the Accleration of Scientific and Technical Progress on 11 June 1985], Moscow, 1985, pp 4-5.

2. "Materialy Plenuma Tsentralnogo Komiteta KPSS 23 aprelya 1985 goda" [Materials of the CPSU Central Committee Plenum of 23 April 1985], Moscow, 1985, p 10.

3. M. S. Gorbachev, Op. cit., p 29.

4. A detailed characterization of scientific and technical progress was given by V. G. Lebedev (see "Materialno-tekhnicheskaya baza kommunizma. Sotsialno-economicheskaya model" [The Material and Technical Base of Communism. A Socioeconomic Model], Moscow, 1978, pp 66-68).

5. See L. Smyshlyayeva, "The Improvement of the Reproduction Structure of Capital Investments," VOPROSY EKONOMIKI, No 9, 1983, p 27.

6. See V. Yefimov, "The Efficiency of the Use of Materials," PLANOVOYE KHOZYAYSTVO, No 8, 1983, p 35.

7. M. S. Gorbachev, Op. cit., pp 11-12.

8. See N. Glushkov, "Planned Pricing: Means of Improvement," KOMMUNIST, No 3, 1985, p 43.

9. M. S. Gorbachev. "Zhivoye tvorchestvo naroda. Doklad na Vsesoyuznoy prakticheskoy konferentsii 'Sovershenstvovniye razvitogo sotsializma i ideologicheskaya rabota partii v svete resheniy iyunskogo (1983 g.) Plenuma TsK KPSS' 10 dekabrya 1984 goda" [The Lively Creativity of the People. Report at the All-Union Practical Conference "The Improvement of Mature Socialism and the Ideological Work of the Party in Light of the Decisions of the June (1983) CPSU Central Committee Plenum" on 10 December 1984], Moscow, 1985, p 21.

10. See "Scientific and Technical Progress and the Intensification of Production," VOPROSY EKONOMIKI, No 9, 1984, p 16.

11. See L. V. Kantorovich, "Scientific and Technical Progress--Economic Problems," EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA, No 1, 1985, p 19.

12. See D. Zhimerin, "Technical Progress: Achievements and Prospects," PLANOVOYE KHOZYAYSTVO, No 6, 1983, p 10.

13. See PRAVDA, 28 August 1983, p 1.

14. See VOPROSY EKONOMIKI, No 9, 1984, p 15.

15. See "The Improvement of the Planning of Science and Technology," PLANOVOYE KHOZYAYSTVO, No 2, 1985, p 31.

16. M. S. Gorbachev, "Korennoy vopros ekonomicheskoy politiki partii. Doklad na soveshchanii v TsK KPSS po voprosam nauchno-tekhnicheskogo progressa 11 iyunya 1985 goda," p 22.

17. On the comprehensive approach to the management of scientific and technical progress see V. A. Medvedev, "Upravleniye sotsialisticheskim proizvodstvom: problemy teorii i praktiki" [The Management of Socialist Production: Problems of Theory and Practice], Moscow, 1983, pp 129-131.

18. See A. I. Milyukov, "Eksperiment v promyshlennosti" [The Experiment in Industry], Moscow, 1984, p 29.

19. See A. I. Milyukov, "Eksperiment v promyshlennosti," p 31.

20. See V. P. Loginov, "On the Directions and Factors of the Intensification of the Economy," EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA, No 2, 1983, p 13.

21. For more detail on this see L. I. Abalkin, "Mature Socialism and the Formation of Modern Economic Thinking," KOMMUNIST, No 18, 1984.

7807
CSO: 1814/24

ACHIEVEMENTS OF INSTITUTE OF AUTOMATION AND ELECTROMETRY

Moscow LITERATURNAYA GAZETA in Russian 21 Aug 85 p 10

[Interview with Academician Yuriy Yefremovich Nesterikhin, director of the Institute of Automation and Electrometry of the Siberian Department of the USSR Academy of Sciences, by LITERATURNAYA GAZETA correspondent Z. Ibragimova (Novosibirsk): "The Energy of Novelty"; date and place not given; first paragraph is LITERATURNAYA GAZETA introduction]

[Text] Our correspondent talks with Academician Yu.Ye. Nesterikhin, director of the Institute of Automation and Electrometry of the Siberian Department of the USSR Academy of Sciences.

[Question] Yuriy Yefremovich, before the meeting with you I looked at the publications of our past interviews over the course of nearly 15 years and discovered in them one regularity: we begin to speak about scientific and technical achievements (at your institute there is always something with which to strike the imagination of the journalist), and this is always new information, but as a result we come to conclusions about the need for the reform of psychology, the structure of the management of the economy, and the economic mechanisms of introduction. But in them there is zero novelty. Is that how we will also talk now?

[Answer] You are wrong with that--"zero novelty".... We will try! For nearly 20 years we have been concerned only with the fact that we are seeking the best possibilities for the transfer of the best ideas and best equipment to the national economy! We are drawing something new from the experience we are acquiring.

[Question] "Today the scientific instrument is the sum of all these possibilities." The words are yours. They were written down at the Siberian Instrument-71 Exhibition, that is, 14 years ago.

[Answer] Are you turning me to history? So what, perhaps, already in the late 1960's the essence of the tasks on the acceleration of scientific and technical progress, which are becoming so urgent today, was coming into view. It was clear, in any case, that the changeover to qualitatively new methodologies also requires new approaches to their elaboration. Our institute was narrowly specialized, while specialization (the thing seems

good--a person is absorbed in his subject) inevitability leads to a narrowness of thinking and to the loss of the overall goal. It has gone so far that one engineer at times does not understand another engineer, while physicists find with difficulty a common language with chemists and so on. The majority of scientific and national economic problems are being solved today on the condition of mandatory cooperation with "neighbors." And modern automated systems, for example, concentrate in themselves a larger and larger number of achievements in various fields of science and technology. So it has become necessary to "combine" optics with atomic physics. Exact measurements have become impossible without the use of digital computers.... In short, the goal itself--to develop means of obtaining information and controlling processes and facilities--requires a collective similar to...an orchestra to be established. So that each instrument would sound in its own way, but in the name of overall harmony.

[Question] Reorganization, I remember, was decisive: they removed some people, sought others....

[Answer] People left themselves, having understood that the new tasks were beyond their powers. And it was necessary to gather those who would cope with them.

[Question] Was it possible?

[Answer] I believe so. The main advantage of our collective consists, so it seems to me, in the fact that it is capable of solving CURRENT [in boldface] problems. Such personnel were selected over some 10 years! These are mainly young people--the graduates of our university, the Novosibirsk Electrical Engineering Institute, and other Siberian higher educational institutions. They always contrive to entice our specialists, and another question is already arising: How are they to be kept in Siberia, what is to be opposed to the temptation to move to scientific centers which are a little larger than ours? I have an answer to this question, but about it later. For the present I will say: we are proud of our comprehensively trained, skilled specialists. And if there are personnel, there are results!

[Question] Thus, was the goal achieved?

[Answer] The primary goal is the physical technical and organizational goal. But if you incorporate in the concept "result" the appreciable influence of science on industry, then...the discussion about reorganization also begins here.

In accepting the institute, I knew that it is quicker and easier to invent something new than to introduce this new thing in mass production. I did not have any illusions concerning introduction: experience convinced me that you will not achieve anything in less than 5-7 years. And 5-7 years are the optimum, on the average 10-15 years are needed. For any "trifle"! A period which is devastating for new equipment.... But I understand how difficult it is to shorten it only now, after many years of attempts--practical attempts!--at bringing science closer to industry.

[Question] The attempts gave so much hope! About 10 years ago I myself wrote an article entitled "The Shortest Route Is the Direct Route" about your MKO's.

[Answer] An explanation for the readers: an MKO is an intersectorial design division. Such divisions are being established at plants. The institute transfers to them its own scientists, engineers, and the theme of a specific development. Together they perform scientific research and experimental design work, uniting the technological potentials of several ministries. The scientific research work has not yet been completed, but the experimental design work is already being performed. The experimental design work has not yet been completed, but production is already being prepared for the output of the new thing. The idea lies in the combining of stages, only by means of which it is also possible to shorten drastically the time of introduction. The principle is to do thing together.

[Question] The find with MKO's seemed very promising.... Did it come up to the expectations?

[Answer] The matter is still proceeding slowly. Why? Let us take a look.

The understanding of the difficulties connected with introduction determined the ideology of "a natural economy," for which large scientific collectives strove. In particular, the Institute of Nuclear Physics, from which I came to automation, took upon itself the production of industrial accelerators which it had developed. And time merely confirmed the correctness of the approach--"it is easier to do than to agree." Half of the Soviet accelerators, which are now in operation in the country and abroad, were produced at the Novosibirsk Institute of Nuclear Physics. Half! While the other half were produced by the many sectors of our enormous country, taken together. A convincing example, is it not? But the equipment intended for automation is technologically more complicated than an accelerator--in the sense that several ministries: of the electronics industry, the radio industry, instrument making, automation equipment and control systems, should participate without fail in its development and in the production of even some one device.... Therefore we should have, by relying on the "natural economy," developed our own structure with an outlet to direct cooperation with enterprises of the departments. An economic subdivision--a design bureau--in which at least three departments would come together as at a crossroad, was necessary. Thus the intersectorial design divisions were established in May 1972. The matter did not reduce to the transfer from the institute to plants of documents--letters and statutes, recommendations and prospectuses. The plants received trained specialists with a creative scientific research reserve. The goal is to create at the enterprises themselves the germs of what is new and to "connect" the technology of the departments to the implementation of ideas.

This is common sense, is it not? So it also seemed to us. But we underestimated the power of the main administrations. Everything that in one way or another falls into the field of their activity, is subordinate to departmental interests. And the intersectorial design divisions were a part of the departmental structure--with finances, bonuses and other conditions of existence, while the transfer of new equipment to mass production was speeded

up significantly. After all, for the enterprise the changeover to the production of new equipment is always a risk. Moreover, this is also additional capital investments. The director of the enterprise is concerned about the fulfillment of the plan, frequently the maximum plan. He has neither the resources, the time, nor the desire to take risks. What kind of intersectorial design division will master such a situation?! And the ministry makes the decision to "cut off" this intersectorial design division from the plant and, further, to make it an independent organization. Thus our intersectorial design division also ceased its existence....

The structure is being complicated, while the matter merely suffers from this!

[Question] Do you see a solution?

[Answer] The only way out for us today is the establishment of a scientific and technical association (NTO). Given the preservation of the established relations with departments realistic conditions, under which we could bring an idea not up to some pathetic institute mock-up, but to a small series of models, are necessary. Operating models! When it is a question of the development of very complex and expensive equipment in the shortest possible time, the cooperation of efforts and assets is needed.

[Question] Everyone more or less knows that your equipment is expensive. But far from everyone imagines its advantages....

[Answer] Examples? Today in the United States more than 32,000 devices in machine building are equipped with laser measurers of displacements....

[Question] Pardon me, I had to interrupt. This is an old acquaintance--the IPL (laser measurer of displacements). I remember my own article about it. Again 1971! It was a question of a machine tool, on which your institute had placed a laser measurer of displacements. I quote: "By means of it every precision machine tool can be brought to the precision of the standards which are kept at the metrological institutes of the country. Models of laser measurers have been incorporated in the precision jig-boring machine which was developed by the Vladimir machine builders. This is the first attempt in the practice of world machine building."

[Answer] Your quotations are like salt in a wound.... Unfortunately, at present we have at the outside tens of such machines. Consider the established sequence: we first make a part, then check it. That is, one person can allow defective output, while another person should detect it. Nonsense! It is necessary at once to make a part as precisely as possible. On a precision machine tool. This precision depends on the system of measurement: if the machine tool is equipped with a precision system with a laser gauge, the grading inspector is also not needed. I will not speak of things which go without saying--the saving of metal, the increase of labor productivity, and so on.

Now let us take computer technology. One need not brag of an intelligent attitude toward it. It is a too expensive amusement at whatever cost to acquire computers and to incorporate them in the interior of institutes and

plants as a fashionable wonder. Computer technology should be standardized, efficient and furnished with software. It never ever was any point in writing do-it-yourself software for every computer. The opposite makes sense--not to complicate, but to simplify the use of computer technology!

[Question] Can the CAMAC-class at your institute serve as an example?

[Answer] For the readers: CAMAC is the base for the development of general-purpose systems of the connection of the scientific experiment with a computer. This is a set of standardized devices which make it possible, according to the estimates of specialists, to achieve elegantly and simply the direct contact of the research with the computer. Fine electronic "boxes," so-called functional modules, from which everyone can "construct" the computer systems he needs....

[Question] Yes, of that sort. Now there are already more powerful complexes similar to CAMAC. Here, perhaps, the following comparison is appropriate: first a house is built, then an addition to it, then another one. Look, a living room, then a bedroom, a dining room, a kitchen...have appeared at your place.

[Answer] The Academy of Sciences is the only department in the country, which in practice uses standardized computer technology extensively. While the experience gained by us in the past 12-13 years makes it possible to say that it is possible to make it for industry tenfold more rapidly and at one-tenth the cost than to develop computer technology specially for each problem.

[Question] Personal computers included? How do you, incidentally, feel about them? Is the increase attention of the press to this "latest" word of technology not premature?

[Answer] In our country, unfortunately, nearly every passion turns into megalomania. (Footnote 1) (In Alma-Ata alone, for example, 110 sectorial computer centers are in operation. And this is more than 10,000 workers!) And the fuss about personal computers sooner hinders than helps the matter, with which we are already late. I believe that we should approach the use of personal computers cautiously. This idea was borrowed, and it is necessary to "translate" it into our native language, matching it with our conditions. As it seems to me, in our country it is more sensible to cultivate the collective, "shop" method of using computers. We spend a greater portion of the time in the collective--at schools, institutes, shops, and so on. Therefore, it is also necessary to develop at once collective intelligence.

[Question] As, for example, at the 130th school of the academy campus? The computer is at the computer center, several kilometers from the school, while the terminals are in the classroom....

[Answer] No. For the present this is economically disadvantageous. The mass user should be 10-20 meters from the computer. In the department, the laboratory, and the design bureau the "shop" computer and alongside a microcomputer are being installed. The cost of the equipment is being shared by everyone, it serves a "brigade" of users.

It is necessary to minimize computer equipment--these should be standardized means of automation, which are capable of being developed and "adapting themselves" to the solution of changing problems.

[Question] I saw at your institute a computer designer....

[Answer] A picture for the readers: the operator is at the screen, a colored array is on the screen. White, red, green.... It looks beautiful. This is in my opinion, but the designer does not admire the color composition at all--he creates it, and this is for him not a picturesque sketch, but a working diagram. He can see: here something is unnecessary. Or here it is necessary to redo it. He lifts the light pencil--the unnecessary line began to blink and after pushing a key disappeared. Or, on the contrary, a new line appeared. When the designer considers the work ready, the computer will transmit the "drawing" to the plotter, then the control program to an NC machine tool. A computer itself can also be developed by a computer. Fantastic!

[Question] In the newspaper such a description of the process is also acceptable. But what is its point? Automated production cannot be based on manual processing. The level of designing should correspond to the level of the object. Otherwise what happens? Some 100 people draw the machine tool--10 make it. It is more difficult to design a machine than to produce it. What do you think, why does a complex machine tool with programmed control today and in 3 years not recover its cost? In order to justify itself, it should operate continuously. It is necessary to produce on it products worth 500,000 rubles! That is, it is necessary to be concerned about a high machine shift coefficient, about the quality of repair and maintenance, and about the corresponding organization of production.

[Answer] The most important thing of all is to determine the points for the most efficient use of computer technology. Where should its potential be incorporated--in accounting or in production? Our present concerns about the development of flexible machine systems and about numerical control--this is the answer to the posed question.

Let us take mathematical modeling. What use is it? The designing of the majority of simple mechanical devices can be reduced to some equation. Having solved this equation, it is possible to foresee what overloads will arise and what efforts will be required, and how effective the proposed solution is. Roughly speaking, on paper it will be evident whether or not the device will stand up, will overheat, or will cool off. On paper, and not in metal, as is now being done. After all, for the present the choice of versions is made by trials: they invented a device, assembled it, and put it into service, if it "vibrates," make it differently.... And how much metal alone is used for this! In diesel engine building, for example, mathematical modeling (preliminary playing out on a computer) promises a saving of up to 40 percent of the fuel. A lot, is it not?

[Question] Especially when you know at what cost ore, petroleum, gas, and coal are being produced.... In general, of course, the contrast between what

you see at your institute and what you are faced with in practice--whether it be designers, foundry workers, printers--is enormous....

[Answer] Yes, the situation is changing slowly. How are we working now? There is the institute, under its procedural supervision there is the special design bureau of scientific instrument making, and this is bad, because the special design bureau operates on cost accounting and is not subordinate to us. We transfer to the special design bureau a mock-up for technical modification, but the special design bureau must earn a living. One would like to know: What will they do there--earn a living or strive for something new? In order to earn a living, it is easier to sell what is old. A closed circle. We added to this structure two intersectorial design divisions--and...I will not repeat myself.

There is in the Siberian Department of the USSR Academy of Sciences a pilot plant. In a year it will fill our orders for only 180,000 rubles. A trifle! Why is it that way? If we are charged to develop computer technology, automation, and instrument making, the conditions for this should also exist. It turns out that they require of us that we teach others to play the accordion, but we have the means only to write a self-instruction manual. There are no assets for an accordion. It is possible to prepare a self-instruction manual, but how is one to learn to play the accordion without an accordion? And our task is to provide a small series of "accordions." To test them in the work, in which new personnel will also appear. We will make it, will begin to play ourselves, and will give it to others--that is the means of attaching large-scale industry to science. One must not shove poorly studied assignments into departments with the order--"produce so many units in such and such a year." Who will assemble these "units" and make them work? The loss of money and time....

[Question] It seems so obvious. Are you not becoming angry without reason?

[Answer] Without reason? Even here in the Siberian Department the trends toward the increase of the number of organizations still prevail, but this is a detriment to any serious matter. In case of the given number of specialists (we know our manpower resources) to increase the number of organizations is to increase the number of managerial personnel and to decrease the number of doers. Each organization instantly creates its own "problems," from which the general PROBLEMS [in boldface] merely grow smaller, and their solution becomes incomparably more complicated. The life of every organization is governed by the plan, which has been strictly formulated and as a consequence is intolerant of the slightest changes. Right here we also lose time--on consultations.... And we cannot do without close contacts with the sectors: there is no new methodology without the sum of technologies.

We cannot replace a sector, not one but, at the least, three. We have in our hands mock-ups of jointly developed systems which increase labor productivity by tens and hundreds of fold! These are qualitatively new technologies. It seems that it is impossible not to "be taken ill" with them, having evaluated their advantages. On the contrary! And even the idea of the scientific and technical association seems to pass in words, but in practice there are endless consultations....

Only the concentration of efforts on various scientific directions under the flag of the common goal, only the scale of real work can keep in Siberia trained specialists, the demand for whom is increasing everywhere with each day. So the scientific and technical association settles, in addition to all else, also the question of the attachment of personnel. I will say once again: if there are specialists, there are results!

[Question] I hope in the next interview, say, in about 2-3 years, to find out from you the details of the emergence of the scientific and technical society.

[Answer] Our hopes today are thoroughly backed by the decisions of the party and government on the development of computer technology and by the attention which is being devoted to the problems of the acceleration of scientific and technical progress. The words from the speech of M.S. Gorbachev at the April CPSU Central Committee Plenum: "Revolutionary changes are needed--the changeover to fundamentally new technological systems and to equipment of the latest generations, which yield the greatest impact," sounded especially urgent for our collective.

[Question] Hence, next time shall we talk only about technologies?

[Answer] I would like to!

7807
CSO: 1814/36

FACILITIES AND MANPOWER

PROBLEMS OF SCIENTIFIC PERSONNEL IN CHEMICAL INDUSTRY

Moscow IZVESTIYA in Russian 4 Sep 85 p 2

[Article by R. Lynev: "The Logic of Reorganization. The Collegium of the USSR Ministry of the Chemical Industry Discusses the Question of the Personnel of Sectorial Science and Their Output"]

[Text] At the June conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress a serious claim was made on sectorial science, and first of all on the level of its management. They discussed, in particular, the Ministry of the Chemical Industry, which, on the one hand, has literally become surrounded by a large number of different research institutes and pilot works and, on the other, is suffering from serious shortcomings in the development of new materials and technologies.

Since this the Collegium of the USSR Ministry of the Chemical Industry has already twice heard the question of scientific and technical progress in the sector. In July it approved a program of the reorganization of the work of scientific and planning organizations and pilot works. Recently the same question arose again at a meeting of the collegium of the ministry, but on a different level--the personnel level.

It is logical: at first they outlined what is to be done and how, then who is to do it and by what forces. Today the number of planning, scientific and design organizations and pilot works in the sector exceeds 260. More than 40,000 specialists, among who there are 300 doctors of sciences and 5,500 candidates of sciences, are employed in this sphere. The output....

Let us leave aside for the time being the collectives in which it simply does not exist. More examples of when it does exist were cited at both meetings of the collegium. True, many developments do not go beyond the doors of laboratories, industry implements them with such difficulty and so slowly that this is hindering the development of other sectors. First of all the key sectors: electronics, instrument making, radio engineering.

One of the main causes of the lag is typical not only of chemists. It lies in the fact that in its essence the unified process of the development of what is new is disconnected even within a single department. It turns out that the scientific research institute is responsible for the initial data, the

planning institute is responsible for the designing, the pilot plant is responsible for the testing. Each one has its own balance sheet, its own plan, its own wage system and, hence, its own interests. On the slightest pretext of something being wrong, scientists accuse the designers, the latter accuse the scientists and so on. But production workers need not a record of counterclaims, but a finished product or technology.

What is to be done? In general it is clear: unite the uncoordinated forces. Set for them a common task. Establish common responsibility.

The form of such consolidation as a whole has also been found: the scientific production association (NPO). The changeover to it has also become one of the main directions of reorganization in the sector. Here it is appropriate to recall that chemists have acted more than once as innovators in our economy. Precisely they at one time gave it the valuable Shchekino experiment. Having altered it and adapted it to the specific nature of the scientific collective, they obtained another valuable experiment, which is known as the "Karpov" experiment, which, it is true, was also not brought to logical conclusion even where it originated--at the Scientific Research Institute of Physical Chemistry imeni Karpov. And it was not brought to logical conclusion not through the fault of its initiators, but due to the same factors which also undermined the Shchekino method--I have in mind the conservatism in the elaboration of legal and financial norms.

Or take the same scientific production associations. The form of the unification of science with production is not new for the sector. Thus, the Khimavtomatika Scientific Production Association has been operating for more than 30 years now. Having united science, designing and the production of prototypes, here for a long time now they have been developing instruments on the average 2-4 years more rapidly than, say, in instrument making. At the same time many important questions of planning and stimulation so far have been settled in such a way that the same Shchekino workers and the collective of the Khimavtomatika Scientific Production Association are the losers. Hence, due to the lack of their settlement, as Yu. M. Luzhkov, the general director of this association, stated backed at the July collegium, the weak interest of scientists in work to full effect and the low scientific level of developments.

"The changeover to complete cost accounting--that is what is needed. In other words, great freedom of maneuvering is needed," Luzhkov stated frankly. "We have raised these questions many times, but things have not budged a bit there."

Strictly speaking, it is not entirely "there": whereas previously there were only a few such scientific production associations as the Khimavtomatika Association in the sector, now there are 21. While in the immediate future there will be even more of them.

"Hence," Deputy Minister S. V. Golubkov reflected later, in commenting on the conclusions of the collegium, "for inspecting organs the work will increase. For what happens? The lack of settlement of legal and financial questions makes it possible to interpret the same action of the management of a

scientific production association, say, an order on the payment of a bonus for participation in a new development both as a stimulus of initiative and as a financial violation. Moreover, one commission frequently revises the conclusions of another, which suggests the idea: Is it not time instead of all these commissions to put to work the commissions of the State Committee for Science and Technology and together with other departments to decide what the standard scientific production association should be, to draft a model statute on its tasks, rights, duties and management? Otherwise the reorganization may lead only to the establishment of a new structure."

It is impossible not to agree with this.

A well-known and age-old problem is the staffs of sectorial science. In general it is clear why and how they have become inflated in many scientific subdivisions. Most often the aspiration not simply to back with personnel the elaboration of some theme, for which at times 5-10 people is sufficient, was at the basis of this. It is also a matter of the fact that they wanted, as a rule, to place an established scientist in charge of the work, having supported his position with a higher rate. But this is easier if there are subordinate to him not 5-10 people, but more, for example, a department. Everything seems logical. But the theme, as they say, "was played to death" a long time ago, it is time to complete it. But it is difficult to do this: there are staffs! Not without reason has the transfer of 30 plus fruitless scientific subdivision to production, which has been outlined in the sector, become bogged down, while there was no discussion at the meeting of the collegium of the elimination of such staff buildups.

If the general director of a scientific production association decides to carry out such an operation, he will also encounter the same difficulties, the manning table and so forth. He will also encounter them in case of the need to take on the staff of the scientific production association for the fulfillment of temporary tasks a group of scientists, designers and adjusters. And it turns out (this has been confirmed again and again by practice) that the scientific production association itself, its structure in individual cases can be an obstacle in the way of what is new. As to minor introducing forms--engineering, start-up and adjustment forms, which are capable of being even more effective, no one recalled them.

Today, it was stated at the collegium, a draft of the program of the chemicalization of the national economy has already been drawn up. In accordance with it labor productivity in the sector should increase significantly to 2000. Owing to this it is planned to free conditionally hundreds of thousands of workers. Staffs of highly skilled specialists are needed in order to achieve this. Unfortunately, the alarming misalignments in their training are appreciable. V. S. Smetanin, chief of the Design and Capital Construction Administration of the ministry, complained that the design subdivisions are being merged within the scientific production association as weakened ones as compared with the scientific subdivisions. Why? As a result of the certification of recent months 2,000 people, who are professionally unfit for designing, were released. Of the remaining specialists 70 percent are people with a length of service of 30 years and more. The question of the succession of generations is arising. Where are

young people? They, alas, preferred to enter science, where both the pay until until recently was higher and the opportunities for advancement were broader.

They saw this disease in the sector late and are striving to treat it by the establishment of base chairs at design institutes--here the future engineers will learn more objectively the job with which they will have to deal. For the present there are only a few such chairs.

The situation with the training of process engineers is also no better. By the oversight first of all of the Personnel and Educational Institutions Administration of the ministry, which L. G. Marakhovskiy heads, and, of course, the USSR Ministry of Higher and Secondary Specialized Education the training in this specialty at higher educational institutions has been curtailed almost everywhere. Only a few groups have remained. It turned out that the graduates with diplomas of chemists know chemical formulas, have a command of the principles of programming and mathematical modeling, but do not know at all the main thing: the processes and equipment, with which they are to work on the job. In this respect the graduates of higher educational institutions nearly always are more poorly trained than technicians and the graduates of vocational and technical schools. And they are oriented mainly toward work once again in science, and not at a works. The proportion of people, who do not know production, in it is more and more appreciable, which affects the quality of developments and, in the opinion of I. V. Konoval, director of the Okhtinskiy Plastpolimer Scientific Production Association (Leningrad), has turned into a real scourge of the sector.

"At the association we understood this," he says, "and are striving to replenish the ranks of scientists only by means of product workers. We are trying to see to it that the future supervisor of a scientific development would test himself both in designing and on the job. And would not simply test himself, but would prove himself and would raise the lagging section. Then it is clear that he has organizing instincts and has a knowledge of the processes as a whole. But without this what are 'bare' research skills worth now?"

The conclusion is obvious. And it is useful within, of course, not the scientific production association alone.

In connection with the reorganization much was said about the figure of the general director of the scientific production association and the new demands on him. It is a paradox--I want to think that it is a temporary one--but today this category of managers is the only one, for which no forms of training and the improvement of skills are envisaged. It was also noted that the inability of some managers to organize in the new way the labor in collectives, which consist of scientists, designers and production workers, has come to light in recent times.

Much was said in the collegium and in the lobby about the occurring and potential personnel and structural changes and about what to expect from them. This, so to speak, is the external part of the reorganization.

But here is what was heard during this somehow in passing: "With the new year the sector is changing over to the economic experiment." In passing about what could give the entire conversation a different tone, a different content. Not without reason, after all, was it also indicated at the conference in the CPSU Central Committee on questions of scientific and technical progress that it is necessary to link the reform of the organizational structure fundamentally with the strengthening of cost accounting, economic levers and stimuli.

Such a link so far is very possible visible. Does not everything in a different conception reduce merely to external changes?

Much in our economy depends on the work of chemists and their sector. That is why the reorganization for them is not at all a narrow sectorial matter.

7807
CSO: 1814/31

LATVIAN ORGANIZATION FOR DEVELOPMENT OF NEW EQUIPMENT

Riga SOVETSKAYA LATVIYA in Russian 10 Oct 85 p 2

[Article by Zh. Spugis, chief of the Sector of the Economics and Organization of Production of the Department for the Development and Production of Prototypes of New Equipment: "It Is Simply Impossible in the Old Way"]

[Text] In the dialogue of science with production the economic aspect of the matter is of decisive importance. For the acceleration of scientific and technical progress is inconceivable without the constant improvement of the economic mechanism, which is called upon to provide favorable conditions for the development, assimilation and industrial introduction of new equipment. Here the maximum shortening of the time of the implementation of scientific and technical achievements requires special attention, since, if new developments do not receive introduction and extensive dissemination, the value of one idea or another in practice may be reduced to nought.

It is no secret that at present the gap between the origination of interesting scientific engineering ideas and their implementation still remains large. In time this frequently takes 5-10 or else more years, as a result of which some of the proposed innovations by the time of introduction become hopelessly obsolete.

There are many reasons for such a phenomenon. Among them are the reluctance of managers to reorganize the already fixed mechanism of operating technologies, departmental barriers both in the very sphere of production and at the junction of related sciences and much more.

Under present conditions, when the pace of the introduction and most extensive dissemination of the achievements of science and technology in production has become the basic condition of the dynamic development of the national economy, the task of developing a mobile mechanism of introduction within an intersectorial organization, which is capable of quickly formulating and implementing its own or borrowed advanced technical ideas, is arising. The inefficiency of the activity of a large number of departmental scientific and planning and design organizations, which belong to sectorial science, first of all attests to the need for the establishment of such intersectorial organizations. The analysis shows that not more than a third of their developments achieve, and with a great delay, introduction in practice.

In our republic the dispersal of the scientific and technical potential according to the sectorial principle is also appreciable. At the same time precisely in Latvia the mechanism of an intersectorial organization, of which the provision of assistance to enterprises, which do not have their own scientific research institutes, design bureaus and pilot works, has become the basic purpose, has already been tested to some extent. Such an organization is the ORIONT--the Department for the Development and Production of Prototypes of New Equipment, which since 1976 has been formally subordinate to the Silava Scientific Production Association. But this is formally. While in fact the ORIONT for a long time has been performing the functions of an intersectorial introducing organization.

Today proposals are being received at the ORIONT both from ministries, departments, enterprises and institutions of various types and from individual authors of discoveries and inventions and efficiency experts for the development of devices, equipment, instruments, attachments, machines and other prototypes of new equipment. If the preliminary economic calculations and substantiations of the efficiency show the unquestionable value of one proposal or another for the national economy of the republic, the ORIONT, if there are organizations, which are interested in the introduction of the given innovation and are willing to perform the role of clients, includes this theme in the plan of its work.

The idea in such cases is turned over, as they say, turnkey. The designers of the ORIONT develop the working drawings, while the pilot experimental section ensures the production of the prototypes of the new equipment. Moreover, their adjustment is performed, authors' supervision up to complete placement into operation is carried out.

The basic indicator of all the cost accounting activity of the ORIONT is the efficiency of the prototypes of new equipment, which have been introduced by it. Here the wage of the staff members also depends on this. Such an organization is completely unique in its functions, structure and methods of work and does not have analogues in the country. It is also important to note that during the time of its existence it has made very significant gains. Although the number of staff members of the ORIONT--designers and workers of high skills--for several years now has not exceeded 65, the department has introduced in the most different sectors of the national economy of Latvia 95 percent of its developments. Moreover, the average time of introduction came to only 3 years. The total economic efficiency of the activity of this department has exceeded 2 million rubles, while the amount of its work since 1976 has increased by more than twofold.

The new formation has convincingly demonstrated not only its viability and necessity, but also the fact that the principles, which were incorporated during its establishment, were correct. Today the ORIONT is developing prototypes of new equipment, which are intended both for some one sector or organization and for enterprises of various sectors of industry, transportation, municipal services and even agriculture.

Here are several of the developments of the department. An automatic line for the production of candied cheese curds with an economic effectiveness of

135,000 rubles a year. A multichannel press for the production of peat briquets. Subsequently it also proved to be suitable for the briquetting of sawdust and chips, while at present specialists of the ORIONT on the order of the republic Ministry of Agriculture are adapting the same press for the production of fodder pellets which are used in animal husbandry. Devices for the saturation of water with oxygen at pond fishing farms of the republic have also been developed. Soon such aerators also proved necessary for municipal service and food workers. By next year it has been decided to produce more than 300 units of such devices. The emulsifiers, which were proposed by the ORIONT and are conducive to the saving of up to 3 percent of the diesel fuel, proved to be very efficient even where their use had not been planned--on vessels of the maritime fleet.

Many of these and other innovations are at the level of inventions and characterize the diversity of the activity of the department. The file of orders of the ORIONT is forming rapidly, since proposals are also constantly arriving here from all corners of the country. The orders are most diverse both in their themes and in their economic importance.

But the potentials of the department are not unlimited. Each time a careful analysis and the proper appraisal of the priority of one order or another and of its value for the national economy of the republic are necessary. Unfortunately, it is not always possible to achieve this. And here is why.

The functions and potentials of the ORIONT as an intersectorial organization long ago came into conflict with the structural restrictions, which the administrative, financial and economic subordination to the purely sectorial Silava Association formally imposes on it. Life today dictates the need for the separation of the ORIONT from the Silava Association and its transformation into an independent large intersectorial scientific production association or into an intersectorial center for the introduction of scientific and technical progress, so that the ORIONT could during the years of the 12th Five-Year Plan drastically increase the amount of its work and meet more completely the needs of the national economy of Latvia for new developments. Here it is necessary to transfer to the ORIONT one or two sectorial design bureaus and in addition to establish a consultation service, a bank of reserves of equipment, an electronics laboratory and a computer center based on minicomputers.

But what is happening today? The Silava Association is in essence the intermediate link between the ORIONT and production. The Silava Association concludes contracts with enterprises and organizations on the development of innovations, performs the role of the client, even if one order or another is not of decisive importance for the economics of the national economy of the republic, and establishes the indicators, the conditions and the amounts of the remuneration of labor and the payment of bonuses to specialists of the ORIONT, at times taking as a guide criteria of a purely departmental nature.

The old forms interfere with work in the new way. It is necessary to bring the ORIONT into direct relations with enterprises and production, having given it as a cost accounting organization, which has existed for a long time, more rights and opportunities to work in the main directions of scientific and technical progress, as the decisions of the April (1985) CPSU Central Committee Plenum and the corresponding conference in the party Central Committee require.

7807
CSO: 1814/31

CHANGE IN PROCEDURE OF DEFENDING DISSERTATIONS PROPOSED

Moscow LITERATURNAYA GAZETA in Russian 28 Aug 85 p 12

[Article by doctor of juridical sciences, Professor V. Savitskiy: "The Ritual Called the 'Defense'"; passages rendered in all capital letters printed in boldface in source]

[Text] The scientist, the instructor of a higher educational institution is a busy person. He constantly does not have enough time to complete an article for a journal, to prepare for a lecture, to draw up a procedural elaboration. Moreover, there are a large number of public assignments. But all this is necessary and, apparently, inevitable--such is the rhythm of modern life. But since one cannot chose, it remains merely to determine the degree of the importance of the matters, with which one has to deal.

Thus I would place in one of the last places in efficiency for science the hours-long procedure which is called the defense of a dissertation. I am convinced that in its present form the defense is a simple formality. But far from an inoffensive formality, if you calculate on the scale of the country how many valuable hours (valuable in the literal sense--the wage, after all, is considerable) doctors of sciences spend sitting on special councils which award academic degrees. It would be a different matter if they sat for a reason--if they presented degrees to worthy people and rejected casual and untalented people. But they do not reject them! Rather, they do reject them, but extremely rarely.

But the trouble, of course, lies not only in the material aspect of the matter. The main thing consists in the moral harm, which does not lend itself to calculation in monetary terms and which is done to science by immature doctors and candidates, who have not formed as scientists and are entering it (and, therefore, in the future represent it). Science is being choked by failures, for whom the obtaining of the cherished degree is the only and ultimate goal and a means of cutting coupons for all their remaining life.

There are many components of the qualitative improvement of the system of the training of scientists, and many of them in recent years have been introduced in practice (the Higher Certification Commission--VAK--has been reorganized, specialized councils have been set up, the demands made on the content of dissertations have been formulated more strictly and so forth). And all the

same, in my opinion, there are no grounds to speak about complete success in this important state matter. It is a very good thing that the control function of the Higher Certification Commission has now been strengthened considerably in all directions. It is simply remarkable that not one doctoral (and in some cases candidate) dissertation can avoid examination on the part of the corresponding expert council. However, the center of gravity of the difficult and extremely responsible work on the supply of science with highly skilled personnel should be not in the Higher Certification Commission, but "below," that is, in the specialized councils. Precisely they are called upon to serve as the filter which separates the weeds from the grain.

But this filter is special. It obeys the general laws of the development of science and can operate successfully only under the conditions of discussions and a debate.

"THE PUBLIC DEFENSE OF A DISSERTATION SHOULD HAVE THE NATURE OF A SCIENTIFIC DISCUSSION BETWEEN THE SEEKER OF THE DEGREE AND THE OFFICIAL, AS WELL AS UNOFFICIAL OPPONENTS," it is stated in the Statute on the Procedure of the Awarding of Academic Degrees and the Conferment of Academic Titles. However, this requirement remains only on paper.

At present the organization and holding of the defense are organized so that its outcome is predetermined 99 percent of the time in favor of the seeker of the degree. The scientific supervisor of the seeker of the degree knows this best of all. From the very start he is at ease with the result of the future defense. Hence the inadequate attention of the supervisor to the level of the training of the graduate student and the reading of the dissertation "diagonally," at the last moment, when there is no longer any time left for correction and modification. The reckoning--one which has been tried repeatedly and has never failed--is simple: to make up for the faults of the dissertation by means of informal levers.

The bored faces of the members of the specialized council are also a result of the predetermined nature of the entire procedure and outcome of the defense. They have no need to think, to have doubts, to weigh the arguments "for" and "against"--at the defense, as a rule, there are no motives for this, there is no basis for reflections, there is only the ritual, which is prescribed by the instructions and which it is necessary to perform. Therefore, the bored faces are not so very serious, most often empty chairs at the table of the council "listen" to the defense. While those, who are supposed to be sitting in them, are smoking in the corridor, are drinking coffee at the snack bar and are waiting patiently for when they will finally be called to vote.

Usually there is no audience in the hall where the defense is taking place, if you do not count relatives and acquaintances of the seeker of the degree. The scientists and instructors consider it unproductive to spend time on the listening to speeches, in which everything is smoothed over, everything is powdered, everything in the final analysis will reduce without fail to the sacramental: "in spite of... the dissertation writer is deserving." The defense in public opinion has become not an event, but an ordinary everyday occurrence. How is one to speak here about the prestige of science?

So where is the root of evil? I see it in the formed system of the selection and approval of the official opponents. This system eliminates the need for the seeker of the degree to DEMONSTRATE that he is correct and to DEFEND his conclusions from the reproaches that they do not contain novelty, are poorly argued, are unscientific, are erroneous and so on. You will not hear such approaches at a defense, although in many instances there are more than enough grounds for them. But how can the opponent speak against the dissertation writer, if he is bound by the word which he gave to his scientific supervisor? For his very participation in the meeting of the council as an official opponent in fact could occur only on the condition of a loyal attitude toward the dissertation writer, for which the scientific supervisor asked him (if not directly, then by a transparent hint). If he were to turn down this request, the scientific supervisor would never have nominated him as an opponent when discussing the dissertation at the meeting of the chair (sector, laboratory, department), this candidacy never would have figured in the recommendations of the chair to the specialized council, which settles the question of the approval of the opponents.

But suppose the opponent has read the dissertation and has been convinced: no matter how you twist, no matter how you close your eyes to the mistakes, plagiarism and compilation, all the same it is impossible to give a positive review. What should he do--write a negative review?

There seems to be no other way out. But this is easy only in words: either--or.

Once I was myself in such a situation. A professor of one of the higher educational institutions of the capital called me and invited me to be an opponent for the dissertation of his student. I agreed. Alas, the work was performed wretchedly. If there had not been a tacit gentleman's agreement between us, I, of course, would have written a negative review. But they had invited me, they were counting on me. I reported to the professor my opinion of the dissertation, and we decided that the graduate student would take it, would redo it with allowance made for my remarks, and then would bring me a new version. (I will note in parentheses that this entire operation was at variance with the instructions: no corrections are allowed in a dissertation after it is turned over to the opponents. But I know that manipulations of this sort occur not that rarely.) I gave the dissertation back to the graduate student, but never saw it again. Some time later I learned by chance that he had successfully defended himself, but instead of me a more obliging colleague had acted as an official opponent. I do not know how the need to change an opponent was reported to the council (it is possible not to doubt that the real reason was not named), but a fact remains a fact: the replacement of an opponent at the prompting of the scientific supervisor occurs just as easily as his appointment.

Excuse me, the reader has the right to ask, do official opponents never write negative reviews, do they never speak out against the awarding of an academic degree? While not having generalized statistical data (unfortunately, they are also not available in the Higher Certification Commission), still I believe: they write them and they speak out. However, these cases are isolated, unique, an extraordinary event of sorts. I personally do not know

of a single such case, although I have been a member of various scientific councils for more than 20 years now. Five specialized councils, through which hundreds of doctoral and candidate dissertations have passed, function at the institute at which I work, but not once has an official opponent spoken out against. I am convinced that it is possible to observe a similar picture in other councils as well. The exceptions merely confirm the rule. And how can it be otherwise, if the selection of official opponents is the same everywhere, while the personal relations, which are the basis for this procedure, dictate the same stereotype of behavior?

Incidentally, about the "intrigues" of selection. Of course, they do not speak about it openly. But the many years of experience have developed the criteria, by which practically all scientific supervisors abide. First of all it is necessary that a person, with whom the supervisor has good personal contacts, would be an opponent. Further, a scientist, who belongs to the same scientific school as the supervisor or, in any case, shares the views which are presented in the dissertation, should be appointed an opponent. It is also necessary to take into account the ability of the opponent to speak in public, his manner of behaving on the rostrum and even the strength of his vocal cords. It is not out of place to weigh whether the candidate opponent has obvious enemies among the members of the council, in which the defense will take place. It is also necessary to regulate the frequency of the appearances of the same people as opponents so that they would not become too familiar and so on.

As you see, the scientific supervisor has to calculate much in his mind in order to guarantee his subordinate success. I must confess that I myself also act the same way, even when I am convinced of the high quality of the dissertation--why not play it safe, if this has become the general norm?

I should emphasize that everything said also fully applies to the defense of doctoral dissertations. True, in these cases the dissertation writer does not have a scientific supervisor. But the seeker of the degree of doctor of sciences, as a rule, is himself good at finding his bearings in the scientific world, he already has ties, contacts, likings and dislikes. Therefore, he himself together with the chief of the chair (sector) deals with the selection of the opponents. The chief, after all, is also interested in the opinion of the opponents coinciding with the decision of the chair.

So given the established system of the selection and appointment of official opponents one cannot expect of them a serious, objective review of the dissertation. The external decorum is always consistent: in the reviews there are also remarks, there is also criticism, but all this is strictly measured out so that it would not run counter to the final positive conclusion. Therefore, instead of a real discussion, polemics and conflict of opinions a play with a happy ending is performed at the meeting of the council. Everyone understands that they are taking part in a play: the members of the council, the opponents and the dissertation writer himself. But not everyone clearly conceives that the scientific supervisor is the real producer of this play, that precisely he guaranteed the dissertation writer at the defense peace and quiet and the grace of God in the form of an academic degree.

In the process of the defense there is one perilous moment which poor dissertation writers and the scientific supervisors, who know their real value, fear like fire. When after the introductory speech of the seeker of the degree the chairman asks those present: "Are there any questions?"--everyone falls silent in expectation. Each member of the council understands that in the procedure of the defense, which has been rehearsed to the last detail, it is possible only from the responses of the dissertation writer to questions, which have arisen suddenly, to form an adequate idea of who and what he is in reality. But they ask questions rarely and listen not very attentively to the answers--the entire atmosphere of the defense is not conducive to this. Moreover, they know that this single "X-ray" examination of the seeker of the degree all the same will be exceeded with room to spare by the praises of the official opponents.

However, in itself the method of questions on the part of disinterested specialists and the participation in the discussion of people, who are in no way personally connected with the seeker of the degree and his supervisor, are a reliable tool for the objective evaluation of a dissertation. And it is necessary to make it the basic one.

Thus, so that the defense would become a defense in the direct and precise meaning of this word, it is necessary to change radically the procedure of the appointment of official opponents and to eliminate completely the influence of the scientific supervisor or the seeker of the degree himself on the settlement of this issue. A scientist, who acts on conviction, on the basis of the objective evaluation of the dissertation and whom the need to preserve good relations with the scientific supervisor of the dissertation writer or the seeker of the degree does not worry, should be an opponent. But it is possible to achieve this only when the appointment of an OFFICIAL opponent takes place not only in due form, but actually OFFICIALLY.

I propose the following version of the solution. The chair (sector, department) in case of the approval of the dissertation turns over an extract from the minutes and all the other necessary documents to the specialized council. If the council accepts the dissertation for defense, it sends its decision to the corresponding expert council of the Higher Certification Commission with the request to appoint official opponents and the leading organization (institution). In the expert council there should be alphabetical lists of doctors and candidates of sciences, as well as a list of the leading organizations in the given specialty. The opponents and leading organization are approved on the basis of this information at a meeting of the expert council. The candidates should be selected in alphabetical order. The technical personnel of the expert council can do this, but directly under the control of the chairman or his deputy. A notice on the appointment of the opponents is sent to the addressee and in a copy to the specialized council.

A computer could assume this function with the greatest success. If the information on all the doctors and candidates of sciences, their narrow specialty, basic works and so on is put in the memory of a computer, then the choice of opponents will be completely freed of any subjectivism. True, at times certain complications may arise, for example, when it turns out that the scientist who has been appointed an opponent is ill or is away. In such cases

a substitute will probably have to be sought for him. But these negligible technical difficulties cannot be compared with the enormous gain, which science will obtain, when its doors are closed tight to half-educated people and rascals.

The most remarkable thing is that in principle there is nothing new in the proposed solution: 10 years ago it was envisaged in the Statute on the Procedure of the Awarding of Academic Degrees and the Conferment of Academic Titles. It is stated there: "In necessary instances official opponents can be appointed by the USSR Higher Certification Commission." Necessary instances are precisely those, when the appointment of opponents by the specialized council arouses serious doubts. The authors of the statute based themselves, apparently, on the fact that grounds for such doubts will arise only at times. Now we know that they always exist. Is it not time in place of "in necessary instances" to write down unconditionally "in all instances"?

I fully admit that other, more perfect methods of appointing official opponents may also proposed. But I am firmly convinced that all the troubles of the current simple, formal defenses to an enormous extent, if not mainly, stem from the "family" discussion of the dissertation with the help of opponents who have been selected by the scientific supervisor. If this connection between the supervisor and the opponents is broken, just the very possibility in the future of a thorough, impartial analysis of the dissertation at a meeting of the council will force both the seeker of the degree and his scientific supervisor to increase by 10-fold the efforts when preparing the work, so that the dissertation writer would be able to worthily defend his ideas and conclusions in a truly scientific debate. While this, undoubtedly, will contribute to the development of our science.

7807
CSO: 1814/25

TRAINING AND EDUCATION

REFORM OF TRAINING OF SCIENTISTS, PRODUCTION SPECIALISTS URGED

Moscow SOVETSKAYA ROSSIYA in Russian 28 Sep 85 p 1

[Article by SOVESTAKAYA ROSSIYA correspondent for Novosibirsk Oblast N. Senchev: "Personnel for Science"]

[Text] The regular recruitment for the specialized physics and mathematics school attached to Novosibirsk State University has taken place. Hundreds of adolescents from remote regions of Siberia, the Far East, Kazakhstan and Central Asia took part in the three-stage competitive tests for the famous physics and mathematics school.

It is possible, perhaps, to guess in general outline how the fate of the recruits of the specialized school will form. The university--an academic or sectorial institute--a design bureau--a plant or experimental works. Many scientists of Siberia passed through this chain.

The sphere of the application of science has now broadened on an enormous scale. The very nature of the labor of a scientist has also changed. More and more often his workplace is not in a quiet spot of an institute office, but in a plant shop and experimental laboratory. A scientist-engineer--that is what they now call a specialist, who combines fundamental theoretical knowledge with special technical training and knows how to conduct an experiment. An acute shortage of precisely such professionals is being felt in science. And intelligent machines with an electronic filling, having moved from exhibition pavilions to plant shops, often stand idle--there is simply no one to load their brain and to give them work which is within their power.

Sociologists note with alarm: young people are reluctantly entering the research field. At scientific research institutes they lament: the training of the young replacement far from always satisfies today's requirements. Why? In conversations on this theme with scientists of the Siberian Department of the USSR Academy of Sciences and party workers of Novosibirsk I had occasion to hear the most diverse and by no means indisputable opinions. But everyone agreed on the main thing. It is time, it has long been time to shift from the extensive information training of personnel to their intensive fundamental training.

Many promising directions are emerging at the meeting point of the sciences, but they are not being replenished in time by specialists of the corresponding type and, hence, are not developing as dynamically as the interests of the national economy require. In this way a significant deficiency formed in the training of the young scientific replacement, which has a command of computer mathematics and the methods of creative engineering work. This occurred in many ways as a consequence of the fact that the existing rules and the complicated multiple agreements prevented higher educational institutions from changing promptly the training program and introducing new subjects in teaching. For example, after receiving the order from academic institutes on the training of students in the specialty "geochemistry," the management of Novosibirsk University spent several years on firmly establishing the teaching of this specialty.

And this is not the only case. Recently at the Siberian Department of the USSR Academy of Sciences the need arose for staff members of the physical technical type. The university can and is willing to provide the additional staff, but, in order to revise the curriculum, it has to make its way again through the fences of agreements.

It is quite obvious that the system of higher education can and should respond promptly to the requirements of science and should predict its needs for personnel if only for a 5-year period in advance. However, for this, the opinion is expressed, it is necessary to broaden the rights of the rector's offices and scientific councils if only of the large higher educational institutions of the country and to give them greater independence in the planning of the educational process, in the approval of promising specialties and in the enlistment of scientists in individual work with students.

In their day Academician M. A. Lavrentyev and other prominent scientists warned: the aspiration to give a standard amount of knowledge to everyone gradually will have the result that "the candidate for science" will turn out not to be prepared for the chosen role. Life has confirmed the apprehensions. Nevertheless it is difficult to find among yesterday's students a person, who is accustomed to research work and understands thoroughly and soundly a specific scientific field. Novosibirsk in this respect is rather an exception to the rules. At the academy campus they will name tens of young people, who came to the research institutes with much experience in scientific work, a pronounced aptitude for independent research and thorough knowledge. The secret is that while students of the university, starting with the third year they studied in accordance with special programs at the base chairs, which are directly at the Siberian Department of the USSR Academy of Sciences, and associated closely and constantly with leading scientist-academicians. In reality education and science were grasped simultaneously.

Comprehensive training is fertile soil for the nurturing of young gifted people, the initiative of the executives of the Novosibirsk Electrical Equipment Institute, which established close contact with the academic institutes and industrial enterprises of the city and oblast, once again convinces us of this. Having studied well the demand for personnel in the main directions of scientific and technical progress, at the institute they introduced subjects, which are connected with the training of specialists in

flexible automated systems, computer technology and electronic machines. The very nature of the educational process also changed. With the aid of displays and computers they compressed the time, which is allotted for training, and created the conditions for independent work.

And it immediately became visible what it is necessary to get rid of and what it is necessary to adapt to the new trends of life. For example, the opinion that it is advisable to introduce a two-stage system of training at higher educational institutions, became established. At the first stage (3-4 years) it is advisable to train production engineers, forming in them first of all organizing skills. It is advisable to instruct the students, who have displayed the greatest abilities, another 2 years, to reinforce their basic training and to send them to work as research engineers.

The new demands on the training of scientists oblige us also to look in a new way at graduate studies. Among young people the aspiration to study in them has declined appreciably. And this is not by chance. The 3 years allotted to a graduate student are now already insufficient for the preparation of a dissertation which would satisfy the present requirements. It is especially difficult for those graduate students, whose work is accompanied by the organization of laboratory tests and experiments. The obsolete procedure of publishing scientific works, as many people believe, is also a serious barrier for the defense.

In this connection proposals on increasing the training period in graduate studies: full-time--4 years, by correspondence--5 years, are being heard. Is this a solution? It should not be forgotten how valuable time is today. Perhaps it is better to take the path of the intensification of the training of graduate students, to speed up their training by means of computers, to increase the responsibility of scientific supervisors for their wards and their timely defense.

High-quality training from the school desk to graduate studies is a question of the quality of science itself. And, as the experience of the Novosibirsk academy campus showed, the educational scientific production center, which unites higher and secondary specialized educational institutions, academic institutes and industrial enterprises, is a promising form of the training of personnel. The experience of the people of Novosibirsk is being called unique. Since it is unique, hence, it is not suitable for the present for extensive use and its establishment as the basis in the training of personnel. Meanwhile this experience is no longer yesterday. It is today. The integration of education and scientific research--they have arrived at this formula, just as in Novosibirsk, at the academic centers of Moscow, Leningrad and Kiev. The active search for gifted children and their early specialization are being carried out here. It seems to us that this good beginning should also be developed further.

The time of cardinal changes in the very approach to the development of the economy and its sharp intensification by means of a powerful force--scientific and technical progress--has arrived. We should and are obliged, it was stated at the June conference in the CPSU Central Committee, to get a grip on it at all costs. And much, if not the main thing, depends here on those who will

come today and tomorrow to the research institute, the scientific testing ground and the plant shop. Will come not by chance, not with a student's frame of mind, but, as they say, as a learned man, citizen and fighter.

7807
CSO: 1814/26

PATENTS AND INVENTIONS

MEANS OF ELIMINATING OBSTACLES TO USE OF INVENTIONS OUTLINED

Moscow PRAVDA in Russian 16 Sep 85 p 2

[Article by Viktor Reut: "An Invention Was Made. An Economic Review"]

[Text] Each day brings information on the assimilation of the output of new automatic lines or highly productive automatic machine tools and the development of original industrial manipulators, efficient technological processes, and means of mechanization, which free man from difficult physical labor. At the basis of innovations there are frequently inventions which give them the most valuable qualities. In 4 years of the current five-year plan 96,000 inventions were implemented in production. The economic impact from the use of these new technical solutions and efficiency proposals is approaching 30 billion rubles.

The figures, in general, are quite impressive. But if you take into account that only about a third of the inventions developed annually are introduced, while millions of efficiency proposals account for the lion's share of the impact, it will become clear that here the national economy "is failing to get" a very large amount. Much depends, for example, on the scale of the use of innovations. At present an invention, which has been realized in several or even one copy, is already considered introduced, although it is suitable for tens, and at times thousands of enterprises. Accordingly the economic impact is also many times less than the potential impact. What are the reasons?

The Departmental Roost

On receiving the certificate for the discovery of "the effect of abnormally low friction," the authors were overwhelmed by a sense of profound satisfaction. For discoveries are the greatest heights of science, which very few succeed in conquering. In our country only a little more than 300 of them have been registered since 1957. But each discovered, say, previously unknown physical phenomenon contains the germs of new inventions and advanced technological processes, which are capable at times of making an invaluable contribution to the intensification of production. But it also did not occur to the authors that precisely this would serve as the cause of numerous troubles and misfortunes.

The discovery was made by staff members of two scientific institutions--the All-Union Scientific Research Institute of Optical Physical Measurements of the USSR State Committee for Standards and the Institute of Chemical Physics of the USSR Academy of Sciences. The further development of the work took place primarilly at the laboratory of the All-Union Scientific Research Institute of Optical Physical Measurements, which is supervised by one of the authors of the scientific achievement, Professor A. Silin, and his immediate associate, Doctor of Technical Sciences Ye. Dukhovskiy, also a member of the collective of authors. The basic burdens of development, unexpected obstacles, and attacks also befell this laboratory. The whole point is that the inventions being developed--and there are already tens of them--are usable in the most different sectors and are being accepted by production with the utmost pleasure. But who can place them firmly on their feet, except for the authors and the collective which is supervised by them? This also served as one of the causes of the negative attitude of the administration toward the inventors and their creations.

The authors developed, in particular, so-called africtional elastomers--slippery rubbers, of which a friction coefficient, which is several fold less, and a much greater resistance to wear, at times 200-fold greater, are characteristic, which also predetermine the success of the innovation. The use of the innovation on the Druzhba gas pipeline produced an annual saving of 1.7 million rubles. At the First Moscow Watch Plant the innovation made it possible to set up the production of waterproof watches, while in case of the construction of the new television tower in Alma-Ata it made it possible to increase its qualitative characteristics. The requests: "Come to us as well, help" came from all corners of the country.

It turned out that, although the national economy needs the invention very much, it is no good to the All-Union Scientific Research Institute of Optical Physical Measurements: it does not fit its specialization. They began to crack down on the laboratory of A. Silin--they began to decrease the number of staff members and to take away facilities and equipment. They began to respond with stereotype refusals to the requests of enterprises and organizations to help introduce the slippery rubbers.

PRAVDA wrote three times about the abnormal conditions, under which the important scientific and technical direction for the national economy found itself. Chairman of the USSR State Committee for Inventions and Discoveries I. Nayashkov and Chairman of the All-Union Council of Scientific and Technical Societies Academician A. Ishlinskiy back in 1982 addressed to the USSR State Committee for Standards the suggestion to consider the question of the establishment in the system of this committee of a scientific research center for the use of discoveries in the area of friction and wear. However, positive responses never followed. And only now is the question of the transfer of the laboratory of A. Silin to another sector with the preservation of the intersectorial nature of the themes being settled.

There are many examples which attest to the difficulties which the authors of the most efficient--intersectorial--inventions encounter. M. Usherenko, a worker of the Minsk Tractor Plant, addressed a letter to the editorial office of PRAVDA. A new technique and devices for the processing of metal chips,

which decrease by many fold the losses of metal, were developed more than 20 years ago at the enterprise. At a small semi-industrial plant they determined that the economic impact in case of the processing of each ton of scrap cast iron and steel may come to 10-15 rubles, while in case of the processing of scraps of high-grade steels may come to much more. But in 20 years the devices and method were never tested on an industrial scale. No one wanted "to pull the chestnuts out of the fire" not for himself alone, but for all related sectors.

The influence of the "departmental roost" shows especially pointedly in those instances, when innovations benefit not the manufacturing enterprise, but the consumer. How much the construction workers, who are forced to use at times the already obsolete equipment which is being produced by plants of the Ministry of Construction, Road, and Municipal Machine Building, moan, although there are many examples of new, more advanced machines and devices.

The formation of intersectorial associations on the basis of enterprises regardless of their departmental or territorial affiliation is an urgent matter. The expedience of their organization was discussed at the June conference in the CPSU Central Committee. They will help to undercut the basis of departmental narrow-mindedness. For in such organizations first of all statewide interests will gain the upperhand.

Of course, in this case as well one should include the most important inventions in the national economic plans and support their bringing up to industrial production by financing and material and technical supply. And, finally, one should monitor more strictly the progress of the assimilation of innovations, which, in particular, the USSR State Committee for Inventions and Discoveries and the All-Union Society of Inventors and Efficiency Experts could take upon themselves.

As a Man Sows...

Life attests that a taste for innovation must be inculcated not only at enterprises and organizations, but also in the top echelons of sectors. In the practice of several ministries it has become a tradition not to fulfill the assignments on the introduction of new equipment and technology, including inventions. This applies, in particular, to the USSR Ministry of Power and Electrification, the USSR Ministry of Ferrous Metallurgy, the Ministry of the Chemical Industry, and several others.

For example, many domestic developments, which are capable of intensifying metallurgical processes and increasing the quality of metal and the economic efficiency of production, either do not find use at all or are used on a very limited scale. The disdainful attitude toward the fruits of the creative thought of scientists, engineers, and leading workers could not but affect their further innovative work. If we take the same ferrous metallurgy, in 1984 as compared with 1980 the number of applications with respect to the themes of the sector declined sharply, their significance, technical level, and, consequently, the number of issued certificates of authorship decreased significantly. The economic efficiency from the introduction of inventions also "thinned" noticeably.

At present the retooling of a number of sectors of the national economy is being developed, and it is very important that all the most essential things, which have been developed by the innovators of the sector, would find practical application.

Incidentally, there is also another catalyst of scientific and technical progress--these are the engineering centers which are being developed especially intensively at the institutions of the Ukrainian Academy of Sciences. Of course, it is also necessary here that the ministries and departments take steps on the extensive copying of the achievements of science and technology and effective inventions. It is also advisable to set up engineering centers in industry. In machine building, for example, as Candidate of Technical Sciences V. Kochetov (Moscow) suggests, they could be intersectorial--within an organ which specifies the technical policy of all the machine building ministries (like the USSR State Committee for Construction Affairs). Sectorial ones--within ministries, or specialized ones--in scientific production associations--are also possible.

At the same time steps, which make the output of the latest advanced equipment profitable and the production of obsolete, inefficient products unprofitable, should be persistently implemented in practice. One of the decisive levers of the acceleration of scientific and technical progress is seen in the development of such a mechanism of management, which was discussed at the June conference in the CPSU Central Committee.

"Sons" and "Stepsons"

Of course, the most important thing is to set up the timely assimilation, without delays, and, moreover, on a large scale, of efficient innovations. It is just as necessary to create conditions so that their arsenal would constantly be replenished by others--the latest, even more advanced ones. From this point of view it is desireable to establish an efficient order in the entire system of invention.

So far many inventions remain a "reserve fund" of scientific and technical progress. Any organization can draw from this fund as much as it likes. If it wants to. But since there are not that many stimuli to the assimilation of innovations, there are also few who want to pursue them--the number of inventions, which annually supplement the reserve fund, is much less. Therefore, the repository of recognized ideas is replenished year after year, but a significant portion of them becomes obsolete year after year. And, as sad as it may be, such a thing happens at times with quite significant technical solutions, which have promised great advantages. For example, engineer M. Vays (Moscow) in his letter lists a large number of inventions, which would have helped to mechanize several types of manual labor in the fish industry and to save nonferrous metals in the production of sanitary engineering items, but were never implemented.

In addition to the imperfections of the economic mechanism, which were spoken about in detail at the April (1985) CPSU Central Committee Plenum, the "ownerless nature" of inventions themselves also had an effect here. True, the USSR State Committee for Inventions and Discoveries is recommending a

certain portion of them to ministries and departments, but with very modest results, since its recommendations are not mandatory. The services of ministries and departments, which are responsible for invention, are small, are not competent enough, and have poor opportunities to influence the progress and scale of the assimilation of innovations. They are not coping even with those inventions which originate within departments, not to mention those which arose "outside."

Meanwhile precisely the ministries, as many authors of letters believe, should become the potential "proprietors" of the majority of inventions. For this, engineer D. Prokhorov (Moscow) suggests, in them groups of specialists, who are obliged to familiarize themselves with the patent and other technical information, should be set up, the corresponding innovations should be selected, and all the preliminary work on their use should be performed. Candidate of Technical Sciences M. Brovchenko (Lvov), Docent I. Bashlykin (Moscow), and others write about giving the introduction of inventions a planned state basis.

Attention is also directed to the imperfection of the standard documents on invention. It is not enough that it is very difficult to introduce an innovation, but it is even more difficult to obtain the due royalties. At times it is difficult for an innovator to ascertain who used his invention first and when. Why? According to the prevailing statute the enterprise (or ministry), which was the first to introduce the invention, does not receive any privileges for the initiative, but in essence is punished: it should pay the royalties not only for itself, but also for all the subsequent ones which use the innovation. And, therefore, some enterprises do not report back on the introduction of inventions and also do not notify the author, although they are obliged to do this. Frequently they understate the efficiency of the innovation, in order to decrease the amount of the reward.

The division of inventors into "sons" and "stepsons" has been legitimized. The authors of so-called official inventions, which were developed during the fulfillment of plan assignments and were announced on behalf of the organizations, are grouped with the former. An incentive reward is issued to them. The lone person, even if he were to develop "the invention of the century," will not receive anything until it is introduced. And here it is not even a matter of money, but of the disdainful attitude toward thousands of lone inventors and enthusiasts of mass creative technical work. All these shortcomings worry engineers I. Bayenko (Moscow), L. Kats (Vologda), E. Dimant (Riga), patent expert E. Zolotukhin (Donetsk), and others.

There are many reproaches against the expert appraisal. In recent years the USSR State Committee for Inventions and Discoveries has complicated significantly the demands on the drawing up of applications. "This enables the experts to return applications more and more often as improperly drawn up, although they are correct in essence," engineer E. Asadullin (Ufa) complains, which he also felt on the basis of the experience of his own 10 applications. V. Kutev (Leningrad), N. Denisov (Komi ASSR), and others complain of the imperfection of the expert appraisal.

Many conflict situations arise for inventors on the long path from the submitting of an application to the receipt of the royalties for an innovation, which it is necessary at times to collect through the court. But it is also shameful to call the money claimed in this way a reward. The vagueness, lack of clarity, and vulnerability of the prevailing standard documents in the area of invention are the cause of all these absurdities. Therefore, the authors of many letters believe, the rights of the inventor and his business relations with organizations and individual people should be regulated by a special law. "The need for a law on inventors has finally come to a head, the country needs it like air," engineer A. Bulatov (Moscow) is convinced. Many difficulties, which to this day are hindering the more rapid implementation of innovations, including those which are capable of becoming conspicuous landmarks in the scientific and technical progress of various sectors of the national economy, will disappear with its adoption.

7807
CSO: 1814/33

DEVELOPMENTS OF SOLID-STATE PHYSICS, CHEMISTRY FOR INDUSTRY

Moscow IZVESTIYA in Russian 17 October 85 p 2

[Article by Academician A. Prokhorov, academician secretary of the General Physics and Astronomy Department of the USSR Academy of Sciences: "How to Gain Time"]

[Text] The fact that the intensification of the national economy and the use of advanced materials and technologies are the main task of today and tomorrow, was discussed at the CPSU Central Committee Plenum which has just completed its work.

It is well known that the basis of the work of academic institutes is basic research. Precisely it opens new directions in the development of technology and makes it possible to look into its future. On the other hand, it is quite clear that the scientists of the Academy of Sciences cannot remain aloof of the implementation of the basic results obtained by them.

Thus, life dictates to us the combination of basic research with work on the introduction of the obtained results in practice. The observance of the standard in this twofold process is a question of the talent, maturity, and to a certain degree the proficiency of the scientist. Any deviation from the standard does harm to the matter. If he has become excessively carried away by applied work, he has lost speed in basic research: today there are successes in introduction, but tomorrow he will not succeed in offering practice anything new. If he has confined himself entirely to basic work, he has delayed for a long time the practical use of new ideas and in the end has also done harm to science itself. However, it is a matter not only of the position of the scientist.

In recent years a number of new technologies and materials have been developed in the research collectives of the General Physics and Astronomy Department of the USSR Academy of Sciences. Among them are new crystals and glasses for lasers, chips for electronic engineering and computer technology, optical fibers for communications, shaped single crystals of metals, semiconductors and dielectrics, heat-resistant and other materials.

Not by chance am I naming mainly developments in the field of solid-state physics and chemistry. Precisely this field of science yields the most

"materialized" results in the form of new materials and components, which constitute the element base of the most important modern fields of technology. These results can provide an economic return which is capable in a short time of covering the expenditures on introduction.

And nevertheless the shortcomings, which today are characteristic of the interaction of basic science with industry, appear especially pointedly precisely in case of the industrial assimilation of new and the latest technologies and materials.

Here, for example, we have the rather good experience of how the new technology, which was developed at the Institute of General Physics of the USSR Academy of Sciences (IOFAN), was introduced in industry. In the middle of the 1960's on the basis of lengthy basic research scientists developed a fundamentally new method of the induction fusion of nonmetallic refractory materials in a cold container. It was the basis for the technology of obtaining a large number of valuable materials. Among them are the well-known fianites, new extrahard glasses, conducting silicon oxide, and construction polycrystalline materials.

Everyone seems to be interested in the rapid scientific, technical, and national economic assimilation of the valuable materials. But the usual means of introduction through sectorial scientific research institutes was unacceptable. For the method and technology, which were developed by scientists, were distinguished by fundamental novelty. Neither the necessary technological units nor skills in operations of this sort existed in the sectors. And at that time the institute agreed to direct cooperation with the interested enterprises (incidentally, IZVESTIYA told about this).

The Moscow Emitron Plant was the first to respond to the appeal of scientists. Staff members of the plant were trained in work on the unit. Only 4 months were needed to begin at the Emitron Plant the production of fianites and other materials.

The direct introduction of the technology of fianites was in all respects successful. Then in the same short time the development was turned over to a number of enterprises. In a short time the staff members of the institute gathered and turned over to the enterprises seven sets of highly productive production equipment. This made it possible to quickly assimilate for the first time in the world the commercial production of fianites and ultrapure fused ceramic materials.

However, the staff members of the institute understood that even if they were to completely cease to deal with their immediate job--basic research--and were to change over completely to the introduction of production equipment in industry, even then they would not be able to meet all its demands. Therefore, the USSR Academy of Sciences addressed to the Ministry of the Electrical Equipment Industry the proposal to develop and begin the output of a series of industrial units for the fusing and crystallization of refractory materials in cold crucibles. The Institute of High Frequency Currents imeni V.P. Vologdin (VNII TVCh)--the main institute in the ministry for the development of high-frequency equipment--performed this work. In accordance

with the technical assignment of the Institute of General Physics of the USSR Academy of Sciences the Kristall-401-fianit and Kristall-403 units were developed for the first time in the world.

It should be emphasized that the series production of this equipment (today 70 units have been produced, which is ensuring the large-scale production of fianite and ultrapure fused ceramic materials) does not have a precendent in world practice. In the developed capitalist countries there are only laboratory mock-ups of similar units. The originality of the units and the technological processes is protected by 60 certificates of authorship. At present the Scientific Research Institute of High Frequency Currents imeni V.P. Vologdin is developing highly economical commercial units with a capacity of the coal container of about half a cubic meter, which corresponds to a load of approximately 3 tons of fianite.

The development of a new unit for the growing of individual crystals is also being completed. Such units will make it possible to eliminate from the technological cycle a large amount of the precious and very scarce metals iridium and platinum.

The technological units with a cold crucible are today the basic unit of a large number of industrial technologies. In particular, they are being used for the obtaining of fianites, electric heaters for high-temperature furnaces, electrical periclase, and ultrapure melted aluminum oxide for electronics. The annual national economic impact is now estimated at 60 million rubles.

The new technology not only increases the quality of known materials. A large number of crystals, which it was simply impossible to obtain by previously known methods, were created for the first time on its basis.

The high-quality individual crystals are used for the production of optical parts, special monocrystalline crucibles, backings, implements for microsurgery, as well as jewelry. Poor-quality and small crystals are used for the production of indicators of the content of oxygen in molten metals. The Emitron Plant is now producing in a year about 250,000 such indicators for ferrous and nonferrous metallurgy. Starting in 1986 all the metallurgical units of the country will be equipped with these instruments. Even smaller crystals are being used for the production of fianite grinding powders, which have shown themselves to advantage in the processing of semiconductors.

And, finally, the polycrystalline scraps from the production of fianite are used for the production of heating elements and especially refractory ceramics, which are making it possible to develop furnaces which operate on air at temperatures of up to 2,200 degrees Celsius. Such furnaces are needed for the founding of glasses, the baking of ceramic materials, and other purposes.

Thus, the source reagents, which are fed into the cold crucible at the beginning of the technological process, are converted entirely, without stopping, into valuable products and components. At the Emitron Plant alone in recent years products based on components made of fianite worth hundreds of

millions of rubles have been produced. It is also important that here the atmosphere or the water is not being contaminated.

Although fianites were introduced in practice comparatively recently, owing to their valuable properties they were very quickly appreciated by specialists of various sectors of production. The institute received and continues to receive a large number of letters from organizations, which are interested in the assimilation of the technology of fianites and in the acquisition of specimens of crystals or components with a specific set of properties. Many inquiries have also been received from foreign firms, including of the developed capitalist states. The institute for several years has ensured the sale abroad through foreign trade organizations of the country of a batch of fianites and items made from them.

The flow of such inquiries is also continuing today. The scientists of the institute are trying to meet more completely the needs of industry for new technology and new materials. However, the institute does not have special personnel for work with enterprises. The same people, who are conducting basic research in the important sections of physics, are dealing with introduction in industry. It is quite obvious that, when introducing production equipment at plants or producing batches of the necessary crystals for them, scientists lose speed in basic research.

It seems to us that the experience, which was described in the article, confirms the great national economic efficiency of basic research in the field of solid-state physics. At the same time this experience also revealed the negative factors of the formed practice of the cooperation of basic academic science with industry.

How are these factors to be reduced to naught or weakened and how is time thereby to be gained? It seems extremely important to us that assistance would be given to the institutes of the Academy of Sciences in the transfer of their developments to industry. For this it is necessary to set up design and technological bureaus (or to strengthen the existing ones) attached to the leading institutes of the physics type. Working under the supervision of leading scientists, such design bureaus could in a short time set up the production of new materials and instruments, assimilate new technology, prepare the documents, and then transfer the developments to the interested enterprises of industry. We are confident that the expenditures will quickly pay for themselves, while scientific and technical progress will be accelerated significantly.

7807
CSO: 1814/32

WORKING GROUP OF INTERELEKTRO MEETS IN YEREVAN

Yerevan KOMMUNIST in Russian 25 Sep 85 p 2

[Article: "Cooperation in Action"; first four paragraphs are KOMMUNIST introduction]

[Text] The 23d Meeting of Working Group No 3 of Interelektro, in which scientists from Bulgaria, Hungary, the GDR, Poland, Romania, the USSR, Czechoslovakia, and Yugoslavia took part, has concluded in Yerevan at the base of the Armelektrodvigatel Production Association and the Scientific Research Institute of Electrical Machine Building (NIIelektromash).

Such joint meetings embody the coordinated strategy of cooperation and create the prerequisites for the improvement of the structure of the national economy of each of the countries.

At the meeting the progress of the work on the implementation of the comprehensive programs of cooperation in the area of the development and the assimilation in production of unified standardized series of electric motors was examined and proposals on the broadening of the program of cooperation in the area of microprocessor engineering were discussed.

KOMMUNIST correspondent S. Nuridzhanyan addressed to participants in the meeting the request to tell about the importance of such meetings.

"I consider it natural that this meeting was held in Yerevan," Jozef Kohout, leader of the CSSR delegation, says. "For many years now the successes of Armenian scientists and production workers, which have been achieved in the area of induction motors, have been well known to us. Here we have been afforded the opportunity to familiarize ourselves with the experience of the work of electrical machine builders."

Jerzy Kokotewicz, technical director of the EMA-Komal Combine and leader of the Polish delegation, noted that the cooperation of the socialist countries in the area of the electrical equipment industry and, in particular, the establishment of specialized works for the production of induction motors is an important political and economic task, which is aimed at the broadening and intensification of socialist and economic integration and at the meeting of

the need of the national economy of the socialist countries for electric motors.

"Armenia holds one of the leading places in the country in the area of the electrical equipment industry," K. Alikhanyan, director of the Scientific Research Institute of Electrical Machine Building and chairman of the organizing committee, said. "We are actively cooperating with the member countries of Interelektro in the area of the development of low-power induction motors."

A. Vandishev, chief of the Soyuzelektromash All-Union Industrial Association and leader of the USSR delegation, noted that an agreement on the multilateral international specialization and cooperation of the production of induction motors will be drawn up and signed at the meeting.

7807
CSO: 1814/33

ACADEMICIAN KEYERNA ON ESTONIAN SCIENCE-INDUSTRY RELATIONS

Tallinn SOVETSKAYA ESTONIYA in Russian 8 Sep 85 p 2

[Interview with Vice President of the Estonian SSR Academy of Sciences academician Arno Arturovich Keyerna by SOVETSKAYA ESTONIYA correspondent A. Favorskaya: "Reciprocity"; passages rendered in all capital letters printed in boldface in source]

[Text] Our correspondent speaks with Vice President of the Estonian SSR Academy of Sciences academician A. Keyerna.

[Question] Arno Arturovich, the problems of the acceleration of scientific and technical progress are not new for our newspaper. Much has been written and often about scientific developments which are ready to serve the national economy, including by scientists themselves. The difficulties of introducing these developments have been written about especially often. The difficulties were the same as everywhere--the lack of interest of experienced workers in the assimilation of innovations, on the one hand, and the at times inadequate "operational development" of the innovations themselves due to science's lack of a pilot industrial base, on the other. But the time of such a wasteful attitude toward the possibilities of our science and economy, it seems, has ended. How do you scientists sense this?

[Answer] The very interrelations with science are becoming different. Whereas previously, say, in our republic it was possible not to take into account the recommendations of scientists, now they expect and demand of us sound decisions on all the most important questions of the intensification of the economy. The atmosphere in the scientific environment has also changed: we sense that specifically what technical, economic and organizational steps will be taken in the republic in order to accelerate its progress, in many ways now depends on our decisions. I stress ACCELERATE, because many possibilities of improving our management remained for too long a time at the level of good wishes.

[Question] But will not the same thing happen again? Where is the guarantee that scientific recommendations will be joined with practical measures?

[Answer] The whole point is that the task has now been set for our Academy of Sciences--jointly, of course with other leading organizations and

departments--TO ENVISAGE THE LARGE-SCALE USE OF THE ACHIEVEMENTS OF SCIENCE AND TECHNOLOGY WHEN FORMULATING THE DRAFT OF THE STATE PLAN OF THE DEVELOPMENT OF THE REPUBLIC FOR THE NEXT FIVE-YEAR PLAN AND, IN A NUMBER OF CASES, LONGER, TO 2000.

[Question] Well, say, scientists will submit a program of the saving of energy, which has been studied well with respect to all sectors, but, for example, elementary fuel consumption meters, which, as is known, we do not yet have, are still needed.

[Answer] Precisely the assignments on the organization of the output of control instruments--moreover, in a quantity sufficient for the republic--will be a gratifying feature in such a program.

In general, the fundamental novelty of the assignments of the republic government, which the Academy of Sciences is now fulfilling, lies in the fact that each of these assignments is oriented toward real production. For example, the Information Science and Technical Physics Department must not only think over the prospects of research on the development on the basis of microprocessor engineering of new means of automation and computer devices, but also submit the plans of its work on the broadening of the use of this equipment in industry of the republic. Moreover, it must give for this not only rough outlines, but DECISIONS WHICH HAVE BEEN WORKED OUT TECHNOLOGICALLY AND ECONOMICALLY.

It is possible to say the same thing with reference to our physicists, chemists, geologists and biologists. Physicists, in particular, have to incorporate their ideas in the use of laser technology at the RET Production Association. Biologists jointly with the Agroindustrial Association have to expand the range and production of animal and microbic proteins. Chemists....

[Question] Arno Arturovich, chemists, as is known, were not lucky--the important production of prostaglandins would have begun to serve agriculture and medicine much earlier, if they had not suddenly put a temporary halt for the institute to the construction of a new production building of its pilot plant. There were probably some grounds for that, but this is just the same as hitting hands which are busy with work, is it not?

[Answer] I believe that this question will be settled. We, on our part, have now commissioned two departments of the Academy of Sciences to do everything so that the Institute of Chemistry and its new production buildings would be furnished with standardized equipment which is capable of quickly being changed over in case of changes of the production program. Both modern automatic equipment and computers should find a place in the shops. The institute has a large applied reserve--the scientists have obtained effective means of plant protection, new surfactants, scarce pure reagents, all this should acquire a practical outlet.

We intend in general to strengthen the reproduction base of science, especially the pilot and design base. There is the intention to expand our two special design bureaus. It seems that now everyone agrees that this is in the interests of the national economy. But, when the specific plans of

financing and capital investments are examined at the level of the republic....

[Question] Inertia takes effect?

[Answer] Indeed, for the present there are too few practical changes, it is necessary to overcome quickly the inertia of such an approach--at present the entire domestic economic policy of the CPSU Central Committee and the firm policy of the intensification of the economy are aimed at this. It is necessary to shift from words to deed.

[Question] What reserves do you see here in science itself? What do you regard as the main thing in the work on the acceleration of scientific and technical progress?

[Answer] Recently at an expanded meeting of the presidium of the academy with the participation of representatives of various institutes we once again thought about what basic directions of research to give priority to. Undoubtedly, to such ones as biotechnology, the laser program, the development of microprocessor engineering. These directions are most capable of providing ideas which revolutionize production. Here it is necessary not only to strengthen the technical base, but also to insure the training of scientists. And first of all in the specialties which scientific and technical progress will require. It is necessary to return prestige to those occupations which are at the spearhead of progress. Show an interest in the competition for higher educational institutions in such specialties, and you will yourself be convinced that here not everything, unfortunately, is well yet.

[Question] But are the new possibilities of regulating the wage of scientists, which were made available by the government, in some way alleviating the personnel problem?

[Answer] Indeed, this is eliminating many problems. Previously, in order to pay a talented scientist more, it was necessary to establish a sector for him. But this scientist, perhaps, does not like administrative work, it only distracts him. Now it is possible to make such a worker simply a leader and to pay him accordingly. But for the present it is too early to say how we will apply this differentiation.

[Question] But in any case your reliance is on active, responsible people, who act in the spirit of scientific and technical boldness and initiative.

[Answer] But the main thing is reliance on people who are convinced that science is called upon to fulfill the social order. The order which was elaborated and formulated by party congresses and at the conference in the CPSU Central Committee--to accelerate scientific and technical progress in our country.

Incidentally, all the assignments of the republic government for our scientists, about which I spoke to you, are urgent assignments. Let us also add here the proposals, which they expect from us on the increase of the effectiveness of the work of sectorial scientific research and design and

technological organizations and on the improvement of the coordination of all the "shops" of science. The academy has also been commissioned to submit proposals on the strengthening of the plant sector of science.

[Question] What is meant here?

[Answer] The inclusion of sectorial institutes and planning and design organizations within associations and enterprises. The organization of scientific production associations and temporary collectives for the most important problems of scientific and technical progress. But the main thing is the development of highly efficient technologies with the inclusion of the entire cycle--from scientific research to the output of the product. Then the catalyst of progress--science--will be able to work at full power.

7807
CSO: 1814/27

CONTRACT BETWEEN UZBEK ACADEMY, TASHKENT STATE UNIVERSITY

Tashkent PRAVDA VOSTOKA in Russian 12 Sep 85 p 3

[Article (UZTAG): "The Cooperation of Scientific Centers Is Becoming Stronger"]

[Text] A contract, which strengthens the cooperation of the two largest scientific centers of the republic: the Uzbek Academy of Sciences and Tashkent State University imeni V.I. Lenin, has been conluded. This document encompasses all aspects of research work, the introduction of scientific achievements in the practice of the national economy, and the improvement of the training of scientists.

The uniting of forces for the development of basic and applied research in the urgent directions of the natural and social sciences and the humanities, the joint performance of scientific research and experimental design work in accordance with economic contracts, mutual participation in experiments and expeditions, the exchange of information, the holding of scientific meetings at various levels--up to the cooperation of councils of young scientists--are envisaged.

The academy and the university will actively cooperate in the training of instructors and scientists through special-purpose graduate studies and will give each other assistance in the selection of managerial scientific personnel. The practice of the giving of special courses at the university by leading scientists of the academy and at the same time of the participation of university specialists in research, which is being conducted by academic institutes, will be broadened.

The use of computer and other complex equipment will be improved--both scientific collectives will be able to use it.

One of the sections of the contract is devoted to public political and mass cultural work. The academy and the university will increase the assistance to the Society for Knowledge and will jointly organize creative meetings and series of lectures on urgent questions of communist education, scientific and technical progress, and other themes.

The basic document is supplemented by specific contracts between individual institutes and departments of the academy and university faculties and chairs.

This first contract between the academy and the university is intended for the period through 1990.

7807
CSO: 1814/33

CONFERENCE ON CONTRIBUTION OF M.A. LAVRENTYEV TO SOVIET SCIENCE

Kiev PRAVDA UKRAINY in Russian 10 Sep 85 p 3

[Article: "Basic Science in the Service of Progress"]

[Text] Kiev, 9 Sep (RATAU)--The All-Union Conference "Lavrentyev Readings on Mathematics, Mechanics, and Physics," which opened here today, is dedicated to the 85th birthday of the outstanding Soviet scientist and organizer of science, Hero of Socialist Labor and winner of the Lenin Prize and USSR State Prizes Academician M.A. Lavrentyev. Scientists from Hungary, Poland, Yugoslavia, as well as Great Britain, Denmark, the United States, France, and other countries came to the meeting with Soviet mathematicians.

"The basic goal of the Kiev readings," Academician Yu.A. Mitropolskiy, director of the Institute of Mathematics of the Ukrainian SSR Academy of Sciences and chairman of the organizing committee of the conference, said to a RATAU correspondent, "is to contribute to the stepping up of research in the fields of science, which are closely connected with the name of M.A. Lavrentyev, the theory of functions and differential equations, the mechanics and physics of explosive processes, continuum mechanics. The scientist made a basic contribution to their development during the period of his work at the Ukrainian SSR Academy of Sciences in 1939-1949. Under the direct influence of the works of M.A. Lavrentyev intensive basic research emerged and is being developed at the Institute of Electric Welding imeni Ye.O. Paton, the Institute of Mathematics, the Institute of Mechanics, the Institute of Hydromechanics, the Institute of Problems of Material Science, the Institute of Geophysics imeni S.I. Subbotin, and other institutions of the Ukrainian SSR Academy of Sciences, as well as at the university and polytechnical institute of Kiev and other higher educational institutions of the republic. We hope that the discussion at the conference of the problems of the development of such important fields of basic science as theoretical and applied mathematics, mechanics, and physics, which are opening outlets into new types of equipment and technology, will contribute to the acceleration of the socioeconomic development of the country on the basis of scientific and technical progress."

The participation in the readings of prominent scientists of foreign countries is evidence of the great prestige of Soviet science. The dialogue with them will make it possible to share experience and to formulate general concepts of research in the name of peace and the prosperity of all peoples.

The reports "The Scientific, Pedagogical, and Public Activity of M.A. Lavrentyev at the Ukrainian SSR Academy of Sciences" and "M.A. Lavrentyev Is an Engineer," which Academician Yu.A. Mitropolskiy and Academician Yu. Ishlinskiy, chairman of the All-Union Council of Scientific and Technical Societies of the USSR and director of the Institute of Problems of Mechanics of the USSR Academy of Sciences, delivered, were heard at the plenary session. The sections have begun their work.

7807
CSO: 1814/33

BRIEF

CONFERENCE ON SECTORIAL MANAGEMENT--(LATINFORM)--The 3-day applied science conference, which opened on 9 October in Riga, is devoted to the problems of improving sectorial management. It was organized by the USSR Ministry of Instrument Making, Automation Equipment and Control Systems, the Latvian SSR State Planning Committee and the Central Planning and Design Bureau of Mechanization and Automation. Representatives of union and republic ministries and departments, scientists and specialists from a number of republics are taking part in the work of the conference. The experience and problems of the efficient use of material, manpower and financial resources and the increase of the quality of the output being produced on the basis of retooling and the introduction of new equipment and technology are being examined in the reports and statements in light of the decisions of the April (1985) CPSU Central Committee Plenum. Much attention is being devoted to the questions of the use of economic levers of the management of scientific and technical progress. [Text] [Riga SOVETSKAYA LATVIYA in Russian 10 Oct 85 p 1] 7807

CSO: 1814/31

CHEMICAL PROCESS MODELS NOMINATED FOR ARMENIAN STATE PRIZE

Yerevan KOMMUNIST in Russian 28 Sep 85 p 2

[Article by Academician of the USSR Academy of Sciences A. G. Aganbegyan: "Economics--Mathematics--Chemistry"]

[Text] The works of S.L. Kantardzhyan in the area of the mathematical economic modeling of standard processes of chemical technology long ago received deserved recognition not only among specialists and chemists, but also in a number of other sectors. Their basic content consists in the identification of the economic laws which accompany the processes of the development and use of standard processes of chemical technology.

It is well known that in the sectors of industry with instrumental physical chemical technology (chemistry, petrochemistry, metallurgy, cement production, and others) the basic technological units and processes play a decisive role in production efficiency. The economic efficiency of the operation of the enterprise as a whole depends on the indicators of the operation of a large number of expensive and complex technological units. Consequently, the questions of the optimization of all the links of the production process are acquiring particular importance in continuous processes. Here it is necessary to remember that the most important technical and technological parameters can be optimized only with allowance made for economic requirements. Technical requirements not only are insufficient, but are also frequently unsuitable for optimization.

The urgency of the problems, which are examined in the series of works of S.L. Kantardzhyan, which were nominated for the competition, is being increased by the following factors. First, there is the typicalness of the mathematical economic problems, which are examined in them, for a large number of sectors of industry. Second, it is possible to expect that the interest in the problems, which are examined in these works, will constantly increase in connection with the clear tendency for the importance of continuous processes in the national economy to increase and with the ever increasing unit power of the basic units in these processes, as well as in connection with the development of automated control systems of various levels. Third, by the importance and complexity of the very subject of the study--the chemical industry.

The chemical industry is one of the most important sectors of the national economy: the efficiency of the work of other sectors of physical production depends in many ways on the quality of its work. This sector has the most extensive direct and indirect contacts with practically all the sectors of industry, construction, and agriculture. At the same time the chemical industry is a very complex object for mathematical economic modeling. It is distinguished by the large scale of production at individual enterprises; the concentration of production on a small number of large, expensive, and frequently unique units; the commitment to production circulation of large amounts of diverse raw materials, fuel, and semifinished products; the complex physical chemical nature of the basic processes; the close technological connection between individual processes; the probablistic nature of many parameters; the multivariant nature of technical solutions.

The series of works of S.L. Kantardzhyan, which was submitted for the competition, is the basis for a new promising scientific direction of sectorial economics--the modeling of the economics of standard processes of chemical technology, the scientific novelty of the works consists in the synthesis of the ideas and methods of three scientific disciplines--the technology of chemical production, sectorial economics, and applied mathematics. The works of the series are favorably distinguished by the fact that in them the author does not give abstract constructs, which are separated from life, but examines the entire problem of mathematical economic modeling from the point of view of the interests of the practice of the designing of enterprises and the use of prevailing chemical processes.

A large number of original methods, which were developed by the author, were tested in practice and make it possible to simplify significantly the process of mathematical economic modeling and at the same time to ensure the great accuracy of the obtained results, are examined in the works which were included in the series. S.L. Kantardzhyan interprets creatively the possibilities of the construction and use of mathematical economic models for the various hierarchical levels of the chemical technology system. The formulation and use of the models were carried out by him in two directions--the optimum designing and the optimum functioning of enterprises and their subdivisions.

In his works S.L. Kantardzhyan generalized much experience and the results of the solution of the practical problems of the optimization of the processes of chemical works. Here we find an extensive set of problems--from the choice of the optimum design parameters of chemical equipment to the optimization of multistage chemical production and the evaluation of the versions of the specialization of chemical technology systems.

Among the various problems solved by S.L. Kantardzhyan the problems of finding concealed internal production reserves of the decrease of the product cost and the increase of the productivity of equipment merit special attention. It is no secret that not all of our enterprises have yet achieved the rated capacity, that more manpower resources are employed at a number of enterprises as compared with foreign enterprises, and that in our country there are significant reserves of the increase of quality and the saving of raw materials and materials. General Secretary of the CPSU Central Committee

Comrade M.S. Gorbachev has repeatedly directed attention to this in his speeches.

The use of the results obtained by S.L. Kantardzhyan is making it possible to speed up the solution of a number of problems which are connected with the intensification and the increase of the efficiency of social production.

7807
CSO: 1814/32

MOLDAVIAN STATE PRIZES FOR 1985 IN SCIENCE, TECHNOLOGY

Kishinev SOVETSKAYA MOLDAVIYA in Russian 12 Oct 85 p 1

[Article: "The Decree of the Moldavian CP Central Committee and the Moldavian SSR Council of Ministers 'On the Awarded of the 1985 Moldavian SSR State Prizes in Science and Technology'"]

[Text] The Moldavian CP Central Committee and the Moldavian SSR Council of Ministers, having reviewed the suggestion of the Committee for Moldavian SSR State Prizes in Science and Technology, resolves to award the 1985 Moldavian SSR State Prizes in Science and Technology.

1. Yevgeniy Ivanovich Abrasimovskiy, chief of the plant laboratory of the Kishinev Plant of Refrigerators of the Ministry of Machine Building for Light and Food Industry and Household Applicances; Corresponding Member of the Moldavian SSR Academy of Sciences Mirch Kirillovich Bologa, director of the Institute of Applied Physics of the Moldavian SSR Academy of Sciences; Ivan Ivanovich Dorodnyy, chief engineer of projects; Vladimir Yakovlevich Iordanov, deputy chief engineer; Candidate of Technical Sciences Lev Bentsionovich Kotlyarskiy, chief of the main laboratory of polymer coatings; Candidate of Technical Sciences Genrikh Pavlovich Makarov, chief engineer; Igor Semenovich Semernikov, director of the institute; Eduard Andreyevich Utkov, chief of a department; Oleg Aleksandrovich Khrebtov, chief designer of the project of the All-Union Planning and Technological Institute for Electrical Household Machines and Appliances of the Ministry of Machine Building for Light and Food Industry and Household Appliances; Pavel Pavlovich Izmashkin, mechanic of category IV; Mikhail Vasilyevich Kolesnikov, chief engineer; Anatoliy Semenovich Popa, mechanic of category VI, of the Pilot Plant imeni M. I. Kalinin of the Ministry of Machine Building for Light and Food Industry and Household Appliances--for the development and introduction of the technology and complete set of equipment of automated production lines for the application of powder coatings, which ensure high product quality, the saving of material, energy and manpower resources and environmental protection.

2. Candidate of Chemical Sciences Olga Andreyevna Bologa, senior scientific associate; Doctor of Chemical Sciences Nikolay Vasilyevich Gerbeleu, deputy director for scientific work; Vera Yakovlevna Ivanova, instrument control woman; Candidate of Chemical Sciences Nella Nikolayevna Proskina, senior

scientific associate of the Institute of Chemistry of the Moldavian SSR Academy of Sciences; Candidate of Technical Sciences Nonna Yevgenyevna Bulusheva, docent of the Chair of Chemical Technology of Fiber Materials; Doctor of Technical Sciences German Yevseyevich Krichevskiy, chief of the Chair of Chemical Technology of Fiber Materials of the Moscow Textile Institute imeni A. N. Kosygin; Galina Ivanovna Makarova, chief engineer of the finishing factory; Serezha Artavazdovich Manukyan, general director; Yuriy Pavlovich Tsvetkov, deputy chief engineer of the Tiraspol Cotton Production Association; Doctor of Chemical Sciences Nina Mikhaylovna Samus, chief of the Chair of Inorganic Chemistry of Kishinev State University imeni V. I. Lenin--for the synthesis of coordinate compounds of transition metals, their study and use in the coloring of fabrics.

3. Chairman of the Moldavian SSR State Committee for the Supply of Production Equipment for Agriculture Mikhail Vasilyevich Bondarenko; Vitaliy Zinovyevich Gavrilchenko, director; Mikhail Vasilyevich Goryaynov, chief of a sector; Valeriy Fedorovich Krotevich, chief designer of the Moldavian Planning, Design and Technological Institute of Agricultural Equipment [Moldselkhoztekhproyekt] of the Moldavian SSR State Committee for the Supply of Production Equipment for Agriculture; Yefim Grigoryevich Guzun, senior operator of tobacco driers of the Kriulyany Scientific Production Association for Tobacco of the Moldtabakprom Agroindustrial Association; Yuriy Nikolayevich Zinovyev, chairman of the Kolkhozstroy Production Association for Construction of the Moldavian SSR Council of Kolkhozes; Vladimir Kirillovich Ivashchuk, leader of a brigade of stamp operators of the Tiraspol Plant of Casting Machines imeni S. M. Kirov; Vladimir Ivanovich Iryshkov, chairman of the Tabakprom Association of the Moldavian SSR Council of Kolkhozes; Boris Grigoryevich Shevchenko, chief engineer of the production of glandless pumps of the Moldavgidromash Production Association of Pump Building imeni G. I. Kotovskiy--for the improvement and extensive introduction in agricultural production of tobacco driers and equipment, which provide a large socioeconomic impact.

4. Corresponding Member of the USSR Academy of Sciences Aleksandr Aleksandrovich Zhuchenko, supervisor of the work; Corresponding Member of the Moldavian SSR Academy of Sciences Natalya Nikolayevna Balashova, deputy director for scientific work; Nadezhda Ilinichna Bocharnikova, senior scientific associate; Candidate of Agricultural Sciences Tatyana Fominovich Zavertaylo, senior scientific associate; Candidate of Biological Sciences Lyudmila Petrovna Kovtyukh, senior scientific associate; Candidate of Biological Sciences Avram Bentsionovich Korol, chief of a laboratory; Candidate of Biological Sciences Aleksey Petrovich Samovol, senior scientific associate; Candidate of Agricultural Sciences Valentina Sergeyevna Tyarina, senior scientific associate of the Institute of Ecological Genetics of the Moldavian SSR Academy of Sciences; Candidate of Biological Sciences Dmitriy Andreyevich Vyrodov, chief of the artificial climate group; Candidate of Agricultural Sciences Sofya Konstantinovna Korochkina, senior scientific associate; Candidate of Biological Sciences Yuriy Ivanovich Nyutin, senior scientific associate of the Moldavian Scientific Research Institute of Irrigated Farming and Vegetable Growing; Candidate of Biological Sciences Vasiliy Georgiyevich Grati, chief of the Chair of Botany of the Tiraspol State

Pedagogical Institute imeni T. G. Shevchenko--for the work "Recombinogenesis Is a Factor of Evolution and Selection."

5. Doctor of Economic Sciences Sergey Ivanovich Kirke, chief of the Chair of Labor Economics of Kishinev State University imeni V. I. Lenin--for the series of works "The Regional Aspect of Expanded Socialist Reproduction (Theory, Methodology, Practice)."

6. Academician of the Moldavian SSR Academy of Sciences Kharlampiy Grigoryevich Korb, director of the Institute of Language and Literature of the Moldavian SSR Academy of Sciences--for the series of works "Urgent Problems of the Development of Moldavian Classical and Soviet Literature."

[Signed] Secretary of the Moldavian CP Central Committee S. Grossu

Deputy Chairman of the Moldavian SSR Council of Ministers Ye. Kalenik

11 October 1985

7807
CSO: 1814/31

WINNERS OF 1985 KOMSOMOL PRIZES IN SCIENCE, TECHNOLOGY

Moscow KOMSOMOLSKAYA PRAVDA in Russian 29 Oct 85 p 4

[Article: "On the Awarding of the 1985 Leninist Komsomol Prizes. In Science and Techology"]

[Text] The Buro of the All-Union Komsomol Central Committee, having considered the representations of the Commission of the All-Union Komsomol Central Committee for Leninist Komsomol Prizes in Science and Technology, resolves to award the 1985 Leninist Komsomol Prizes to young scientists and specialists of the national economy:

1. Aleksandr Orestovich Aksenov, candidate of medical sciences, senior scientific associate of the Moscow Scientific Research Institute of Eye Microsurgery, Olga Grigoryevna Borina, engineer, Lyudmila Albertovna Demidova, engineer, Aleksey Yevgenyevich Masterov, senior engineer, Vadim Fautovich Musavarov, regulator 6th class, Andrey Arkadyevich Smirnov, designer 2d category, associates of the Gorkiy Scientific Research Institute of Technology and Organization of Production, Irina Leopoldovna Kossovskaya, resident physician of Republic Hospital No 35 (Gorkiy), Aleksandr Ilich Movshovich, associate of the Moscow Scientific Research Institute of Cardiovascular Surgery imeni A.N. Bakulev, Georgiy Yevgenyevich Stolyarenko, junior scientific associate of the All-Union Scientific Research Institute of Eye Diseases, candidates of medical sciences--for a set of works on the development and practical application at clinics of the country of methods and means for endo- and transvitreal eye microsurgery.

2. Vladimir Nikolayevich Anisimov, senior engineer, Rafael Varnazovich Arutyunyan, Sergey Viktorovich Pigulskiy, candidates of physical mathematical sciences, junior scientific associates, Andrey Yulianovich Sebrant, junior scientific associate, workers of the Institute of Atomic Energy imeni I.V. Kurchatov, Sergey Valeryevich Persiyanov, junior scientific associate of the Moscow Institute of Steel and Alloys, Aleksey Grigoryevich Gnedovets, Mikhail Borisovich Ignatyev, junior scientific associates, Igor Yuryevich Smurov, senior scientific associate, candidates of physical mathematical sciences, associates of the Institute of Metallurgy imeni A.A. Baykov, Vladimir Nikolayevich Tokarev, junior scientific associate, Sergey Aleksandrovich Uglov, engineer, associates of the Institute of General Physics of the USSR Academy of Sciences--for the work "Micrometallurgical Processes in Case of the

Pulsed and Repetitive-Pulsed Action of Laser Radiation on the Surface of Metals and Alloys."

3. Yuriy Nikolayevich Antonov, operator, Oleg Trofimovich Kashevskiy, design engineer, associates of a scientific production association, Sergey Sergeyevich Guz, Aleksandr Yulyevich Shelukhin, chief engineers, Aleksandr Mikhaylovich Pogorelyy, senior engineer, associates of the Experimental Design Bureau of the Moscow Power Engineering Institute of the USSR Ministry of Higher and Secondary Specialized Education, Aleksandr Ivanovich Zakharov, Viktor Pavlovich Sinilo, junior scientific associates, Vyacheslav Yevgenyevich Zimov, Vladimir Alekseyevich Shubin, senior engineers, associates of the Institute of Radio Engineering and Electronics of the USSR Academy of Sciences, Andrey Konstantinovich Shestakov, senior research engineer of a scientific production association--for the development of the radar device of the Venera-15 and Venera-16 automatic interplanetary stations and the synthesis of images and profiles of the surface elevations of the planet Venus.

4. Yevgeniy Samuilovich Ashpiz, candidate of technical sciences, acting chief of a laboratory, Igor Feliksovich Kovalev, assistant lecturer, Vladimir Yuryevich Polyakov, deputy secretary of the All-Union Komsomol committee, associates of the Moscow Institute of Railway Transportation Engineers--for the study and development of advanced scientific and technical approaches to increasing the operational reliability of railroad track.

5. Vladimir Vladimirovich Berezhnov, candidate of technical sciences, assistant lecturer, Vladimir Valentinovich Moshkin, engineer, Yuriy Konstantinovich Fetisov, candidate of physical mathematical sciences, assistant lecturer, Vladimir Nikolayevich Shumilov, Sergey Aleksandrovich Pogozhev, candidates of technical sciences, junior scientific associates, Viktor Stepanovich Lutovinov, candidate of physical mathematical sciences, docent, associates of the Moscow Institute of Radio Engineering, Electronics, and Automation, Aleksandr Yuryevich Lebedev, candidate of physical mathematical sciences, junior scientific associate of the Institute of Atomic Energy imeni I.V. Kurchatov--for the work "Wave Processes in Magnetically Ordered Crystals and Devices Based on Them."

6. Yurata Bronislavovna Bitinayte, Pyatras Stasevich Stakenas, junior scientific associates, Viktoras Vitautovich Butkus, candidate of chemical sciences, chief of a laboratory, associates of the Ferment Scientific Production Association, Grigoriy Leonidovich Dianov, candidate of biological sciences, senior scientific associate, Aleksandr Vladimirovich Mazin, junior scientific associate, workers of the Institute of Cytology and Genetics of the Siberian Department of the USSR Academy of Sciences, Mikhail Ivanovich Boleznin, candidate of biological sciences, senior scientific associate of the All-Union Scientific Research Institute of Applied Microbiology of the Main Administration of the Microbiological Industry, Aleksandr Anatolyevich Gall, junior scientific associate of the Novosibirsk Institute of Organic Chemistry of the Siberian Department of the USSR Academy of Sciences, Eduard Vladimirovich Karamov, senior scientific associate of the Institute of Virology imeni D.I. Ivanovskiy of the USSR Academy of Medical Sciences--for

the work "New Enzymatic and Chemical Methods of the Controlled Mutagenesis, Modification and Restriction of DNA for Genetic Engineering."

7. Vyacheslav Alekseyevich Vakhnenko, Leonid Davidovich Dobrushin, candidates of technical sciences, research associates of the Institute of Electric Welding imeni Ye.O. Paton of the Ukrainian SSR Academy of Sciences, Sergey Georgiyevich Dovbysh, junior scientific associate of the All-Union Scientific Research Institute of Railway Transportation, Vladimir Ilich Lysak, candidate of technical sciences, senior scientific associate of Volgograd Polytechnical Institute, Viktor Aleksandrovich Khripunov, chief engineer of the All-Union Scientific Research, Planning, and Technological Institute of Chemical and Petroleum Equipment, Yevgeniy Gennadiyevich Veretenov, senior scientific associate, Aleksandr Nikolayevich Zolotarev, junior scientific associate, Vladimir Georgiyevich Pinayev, chief of a laboratory, associates of the Altayskiy nauchno-issledovatelskiy institut tekhnologii mashinostroyeniya Scientific Production Association--for the study, development, and introduction of a set of technological processes of explosion welding as applied to the production of units and equipment of power machine building, nonferrous metallurgy, and railway transportation.

8. Svetlana Viktorovna Vakhturova, engineer, Nikolay Anatolyevich Takochakov, chief of a design bureau, workers of the Penza Computer Plant, Mikhail Borisovich Kaul, Nikolay Yuryevich Saltanov, chiefs of sectors, Anna Vladimirovna Sidorova, Viktor Aleksandrovich Fominykh, Tatyana Alekseyevna Ignatyeva, Sergey Borisovich Davydov, engineers 1st category, associates of the Scientific Research Center for Computer Technology--for the work "A Hardware-Software Complex of the Control and Servicing of High-Performance Computers."

9. Aleksandr Silvestrovich Gavrilenko, senior engineer, Vladimir Vitalyevich Kryzhanovskiy, Sergey Anatolyevich Provalov, junior scientific associates, Yuriy Anatolyevich Kuleshov, graduate student, Georgiy Borisovich Toropov, Sergey Yevgenyevich Yatsevich, engineers, Anatoliy Borisovich Fetisov, Sergey Anatolyevich Shilo, chief engineers, associates of the Institute of Radio Engineering and Electronics of the USSR Academy of Sciences, Vladimir Semenovich Lazebnyy, junior scientific associate of Kiev Polytechnical Institute--for the work "A Set of Radiophysical Equipment for Remote Sounding of the Natural Environment."

10. Sergey Ivanovich Gubarev, candidate of physical mathematical sciences, senior scientific associate of the Institute of Solid-State Physics of the USSR Academy of Sciences, Viktor Vasilyevich Moshalkov, doctor of physical mathematical sciences, docent of the Physics Faculty of Moscow State University imeni M.V. Lomonosov--for the work "The Interaction of Charge Carriers With Magnetic Impurities in Metals and Semiconductors."

11. Tamara Petrovna Zalyubovskaya, engineer, Lyudmila Alekseyevna Petrashko, Boris Zakharovich Solyar, junior scientific associates, Aleksandr Yuryevich Sokolovskiy, senior engineer, associates of the All-Union Scientific Research Institute of Petroleum Refining, Mikhail Stanislavovich Matveyev, senior operator 6th class, Valeriy Fedorovich Filimonov, operator 5th class, workers of the Gorkiy Pilot Plant of the All-Union Scientific Research Institute of

Petroleum Refining, Aleksandr Timofeyevich Mitrofanov, operator, Konstantin Viktorovich Ryabov, deputy chief of an installation, workers of the Moscow Petroleum Refinery, Irina Viktorovna Nikolayeva, operator of the Moscow Pilot Industrial Plant of the All-Union Scientific Research Institute of Petroleum Refining, Olga Mikhaylovna Raguzina, laboratory assistant of the Central Laboratory of the Semicoking Plant of the Angarsknefteorgsintez Production Association--for the development and introduction at an installation of catalytic cracking of a catalyzer of carbon monoxide oxidation to increase the output of motor fuels, to conserve energy, and to eliminate harmful atmospheric emissions.

12. Pavel Konstantinovich Ivanov, David Zurabovich Tabagari, Dmitriy Dmitriyevich Kharkevich, Nikolay Nikolayevich Tupitsyn, candidates of medical sciences, junior scientific associates, Aleksandr Svyatoslavovich Ozherelyev, candidate of medical sciences, senior scientific associate, Yelena Vyacheslavovna Savalyeva, senior laboratory assistant, associates of the All-Union Cancer Research Center of the USSR Academy of Medical Sciences, Lev Grigoryevich Gitelman, candidate of medical sciences, chief oncologist of Leningradskiy Rayon of Moscow Oblast (Vidnovskiy Central Rayon Hospital), Mikhail Alekseyevich Kryzhanov, junior scientific associate of the Gorkiy Scientific Research Institute of Epidemiology and Microbiology of the RSFSR Ministry of Health--for the development and introduction in oncological practice of modern immunological methods and domestic monoclonal antibodies.

Igor Vasilyevich Karpukhin, candidate of medical sciences, senior scientific associate of the Urology Clinic of the Central Scientific Research Institute of Health Resorts and Physiotherapy of the USSR Ministry of Health, Sergey Leonidovich Khankin, candidate of medical sciences, senior scientific associate of the Endoscopy Department of the Scientific Research Institute of Proctology of the RSFSR Ministry of Health--for the work "New Diagnostic and Treatment Methods in Andrology and Proctology."

13. Lev Naumovich Kogan, professor, doctor of philosophical sciences, chief of the Chair of the Theory of Scientific Communism and Sociology of Ural University, Boris Sergeyevich Pavlov, candidate of philosophical sciences, associate of the Institute of Economics of the Ural Scientific Center of the USSR Academy of Sciences--for the elaboration of social problems of the communist education of young people.

14. Galimek Amirbekovich Kuralbayev, Absamat Abdulayev, Azizbek Toktomushevich Imanalieyv, Asip Sadyrbekovich Moldokulov, senior scientific associates, Mural Sharshenaliyevich Usubaliyev, Andrey Nikolayevich Mushkalo, junior scientific associates, Alla Petrovna Kizilova, engineer, associates of the All-Union Scientific Research Institute of the Complete Automation of Land Reclamation, Sagdulla Khabibullayevich Nazirov, junior scientific associate of the Uzbek Testing Station of Bast-Fiber Crops, Larisa Dmitrieyvna Matveyeva, chief design engineer, Yuriy Gennadiyevich Ovcharov, design engineer 2d category, associates of the State Special Design Bureau of Irrigation (Uzbek SSR)--for the development and introduction of the USP-250 syphon irrigation device with the use of a discrete (pulsed) technology of surface irrigation.

15. Vyacheslav Yuryevich Mareyev, Aleksandr Aleksandrovich Agapov, candidates of medical sciences, Mikhail Yuryevich Menshikov, candidate of biological sciences, junior scientific associates, Yuriy Aleksandrovich Karpov, Gennadiy Aleksandrovich Konovalov, candidates of medical sciences, Pavel Vladimirovich Avdonin, candidate of biological sciences, senior scientific associates, Fail Taipovich Ageyev, Rad Spiridonovich Vangeli, Sergey Vyacheslavovich Novikov, graduate students, associates of the All-Union Cardiological Science Center of the USSR Academy of Medical Sciences--for the work "New Approaches to Treating Refractory Coronary Deficiency."

16. Barat Rza ogly Nuriyev, candidate of physical mathematical sciences, senior scientific associate of the Institute of Mathematics and Mechanics of the Azerbaijan SSR Academy of Sciences--for the work "Nonlinear Waves in Flexible Filaments During Their Three-Dimensional Motion."

Tatyana Sergeyevna Akhromeyeva, Viktor Aleksandrovich Galaktionov, Georgiy Gennadiyevich Malinetskiy, candidates of physical mathematical sciences, junior scientific associates of the Institute of Applied Matnematics imeni M.V. Keldysh of the USSR Academy of Sciences--for the work "Research in the Theory of Dissipative Structures in Nonlinear Media."

17. Nikita Yevgenyevich Pokrovskiy, candidate of philosophical sciences, editor of a division of the journal KOMMUNIST--for a series of works on the critical analysis of ideological trends in the U.S. youth movement and the history of American philosophy (the monograph "Henry Thoreau").

Andrey Anatolyevich Glushetskiy, candidate of economic sciences, senior scientific associate of the Economics Faculty of Moscow State University imeni M.V. Lomonosov, Aleksey Yuryevich Melentyev, candidate of economic sciences, consultant of a division of the journal KOMMUNIST--for the series of works "National Property and Self-Government in Socialist Society."

18. Yekaterina Nikolayevna Potapova, candidate of technical sciences, junior scientific associate, Oleg Nikolayevich Makarov, Aleksandr Nikolayevich Konshin, Nikolay Ivanovich Yeliseyev, candidates of technical sciences, assistant lecturers, associates of the Moscow Chemical Technology Institute imeni D.I. Mendeleyev, Yuriy Romanovich Krivoborodov, candidate of technical sciences, senior scientific associate of the All-Union Scientific Research Institute of the Cement Industry--for the development and assimilation of a low energy-consuming processing method of cement and its use.

19. Vladimir Baydabekovich Tupelbayev, Sergey Aleksandrovich Kuzmin, candidates of technical sciences, junior scientific associates of the Institute of Control Problems, Aleksandr Borisovich Berlin, radio equipment regulator 6th class, Vladimir Vitalyevich Shikhov, regulator of electromechanical and radio engineering instruments and systems, Sergey Nikolayevich Momotyuk, chief of a pilot works, Aleksandr Anatolyevich Fedoseyenkov, senior scientific associate, Andrey Igorevich Shermakov, senior engineer, Aleksandr Iosifovich Shukshin, associates of the Smolensk Tekhnopribor Scientific Production Association, Lev Mikhaylovich Bolotin, graduate student of the Institute of Machine Science imeni A.A. Blagonravov of the USSR Academy of Sciences, Yevgeniy Mikhaylovich Kalinnikov, graduate

student of Vladimir Polytechnical Institute--for the development of a self-adjusting robot with technical vision for the holding of nonoriented parts.

20. Aleksandr Ilich Shemenda, candidate of physical mathematical sciences, junior scientific associate of the scientific educational museum of physical geography of Moscow State University imeni M.V. Lomonosov--for the work "The Experimental Modeling of the Processes of the Deformation of the Lithosphere."

Andrey Gennadiyevich Abroskin, junior scientific associate of the Institute of General Physics of the USSR Academy of Sciences, Yevgeniy Vladimirovich Baulin, junior scientific associate, Andrey Anatolyevich Demidov, Olga Vladimirovna Kalaydzidis, Aleksandr Mikhaylovich Chekalyuk, candidates of physical mathematical sciences, junior scientific associates, Tatyana Aldefonsovna Gogolinskaya, graduate student, associates of Moscow State University imeni M.V. Lomonosov, Azret Yusupovich Bekkiyev, candidate of physical mathematical sciences, senior scientific associate of the Alpine Institute of Geophysics (Nalchik), Valeriy Pavlovich Slobodyanin, candidate of physical mathematical sciences, senior scientific associate of the Moscow Physical Technical Institute--for the work "Laser Diagnostics of Natural Aqueous Media."

21. Leonid Alekseyevich Yurchenko, chief of a sector, Vladimir Ivanovich Grigoryev, fitter, Oleg Yuryevich Kalashnikov, design engineer 2d category, Mikhail Yuvenalyevich Lyubimov, design engineer 1st category, Andrey Viktorovich Mishchenko, chief designer, Aleksandr Vladimirovich Sukhomlinov, design engineer 2d category, associates of the Novo-Kramatorskiy mashinostroitelnyy zavod imeni V.I. Lenina Production Association--for the work "The Organization of the Inventor's Tracking of the Operation of Unique Rotary Complexes and the Modernization of Units Based on the Experience of the Operation of Equipment."

The collectives of the student design and technological bureau of the Leningrad Institute of Mechanics and the student design and research bureau of the Moscow Engineering Physics Institute--for achievements in the training of highly skilled specialists, the development and introduction in production of new equipment.

12962
CSO: 8144/0357

GENERAL

HUMAN FACTOR OF SCIENTIFIC, TECHNICAL PROGRESS

Moscow MOSCOW NEWS in English No 36, 1985 p 12

[Interview with doctor of philosophical sciences Yevgeniy Zharikov, professor of the Academy of the National Economy attached to the USSR Council of Ministers, by MOSCOW NEWS correspondent Yevgeniy Krushelnitskiy: "Scientific and Technical Progress and the 'Human Factor'"]

[Text] The goal set by the Party is clear--a sharp turn of the country towards intensive development by accelerating scientific and technical progress.

But is the mere awareness of this objective enough? In his speeches General Secretary of the CPSU Central Committee Mikhail Gorbachov has reiterated that the main task now is to effect by all available means a breakthrough in the minds and attitudes of the cadres, from top to bottom. To concentrate their attention on the most important thing--scientific and technical progress. What is needed here is a well-qualified economic approach to innovation, both in science and production.

What psychological barriers will have to be broken?

"MN" correspondent Yevgeny Krushelnitsky talked to Yevgeny ZHARIKOV, D.Sc. (Philosophy), professor of the Academy of the National Economy, attached to the USSR Council of Ministers.

Innovation and Psychology

[Question] What, in your view, should be implied by the "breakthrough in minds and attitudes", vital for the acceleration of socio-economic national development?

[Answer] The underlying factor of all change is man. That is why it is necessary first of all to radically change specialists' attitude towards the new. A breakthrough like this requires an organizational structure which allows a joining together of the interests of all workers at different levels. You will have noticed that a person's behaviour to a large extent depends on

his place in a structure. For instance, I knew one bank director who used to complain about being bound hand and foot with all kinds of instructions limiting his initiative and placing obstacles in his work. After promotion to a post where all those instructions were created, the former director proved no better than his predecessor. On the contrary, the number of instructions increased.

On the other hand, I can cite quite a different instance. I remember one major specialist being very unhappy about the work of his own ministry. When offered a job there he refused on account of being unable to work in an organization whose functions went contrary to his concept of expediency.

So one has to bear in mind when speaking about the human factor, that IT IS NOT ONLY A PERSON'S ATTITUDE TO THE NEW, BUT ALSO THE UPGRADING OF THE ECONOMIC STRUCTURE THAT DETERMINES TO A LARGE EXTENT THIS ATTITUDE [in boldface]. All the elements of the mechanism must be drawn together so that they have a common aim and common interests.

[Question] How essential is the role of the worker's psychology in this context?

[Answer] Both the system of relations and all the innovations that make up the very basis of scientific and technical progress are created by people. It is also people who tend to be in the way of the implementation of those innovations. This is why it is necessary, in my view, first and foremost, to speak not of the technical complications involved in introducing innovations, but of the study of man's capacity for creating and understanding the new in science and technology.

Scientologists have elaborated an exponential law of scientific development inferring the following deduction: the more scientists, the lesser the number of those who make an essential contribution to it. This paradox is borne out by practice. Its solution must be sought in enhancing creative effectiveness in both science and production. It is here that the breakthrough in attitude towards the new steps in. Ideas that are ahead of their time originate not from the preceding development of science. They qualitatively differ from what has previously been common knowledge.

[Question] There still persists an opinion that the new is merely the well-forgotten old.

[Answer] This aphorism was coined by those who are unable to create genuinely new things. Of course, it would be ridiculous to question continuity of science. Moreover, ideas once rejected by the scientific community as nonsensical have to be revived from time to time. If science always repeated itself, no real progress would ever be possible. In order to comprehend better the reason why we have to go into the question of reshaping the attitude towards the new on the part of those who create these new things, let us recall that all the natural sciences used to be united. As more and more facts came to be known, they began to ramify to cease to embrace phenomena as a whole.

Meanwhile a major portion of fruitful ideas and revolutionizing discoveries emerged either on the borderline between different sciences or were given impetus by research in other spheres of knowledge. This is where complications arose. Let us assume a certain scholar, prominent for his time, contributed to science by writing a monograph which later became a classic. Then there appeared some facts that contradicted his main postulates. Would he be able to tell his students: "I was wrong. My theory needs to be modified"? Well, this is occasionally the case but, alas, not often enough. More often than not, the tacit motto of such scholars in respect to what does not fit their theories is as follows: "So much the worse for the facts!" Such a mentality has outlived itself. Scientific schools built on such a foundation find themselves all too often falling short of society's requirements. It is no coincidence that now the top priority is to get science face to face with the needs of social production and equally--production face to face with science.

[Question] But how?

[Answer] First, the experience of scientific and production associations, which has justified itself so much, should be further developed. As to the speedy realization of innovations, the creation of temporary introduction groups similar to those already in existence and solving various scientific and practical tasks, would be of great help. And third, flexible production systems which combine continued output of production with a dynamic readjusting of production, must be given a green light.

Social Order for Talented Inventors

[Question] You talk about the need to change specialists' attitude towards new things. But this means a resolute breakdown of established ways. How is it best to inculcate the right approach from the very beginning?

[Answer] In order to have the right bearings in teaching a scientific worker, one has to take a closer look at who are the initiators of new ideas.

It was long ago observed that outstanding discoveries come as a result of work performed by individuals, not by impersonified groups, by researchers with their broad minds opened to things out of the way, that do not fit the Procrustean bed of these or those "common truths", established traditional views. The ability to think broadly without overstepping the limits of a given science should begin to be formed at school. But this is precisely what school fails to teach. So, in order to become a true creator of new things, a person must shake off the clogs of narrow specialization while still at school, to get out into the open vastness of versatile cognition of an object under investigation.

[Question] Could you cite an example to make your point clearer?

[Answer] Many people take a keen interest in long-term weather forecasts. But when made, they are more like science fiction rather than science. The problem here is that it is not feasible to deduce the required laws from the peculiarities of the weather, that might be characteristic not only of the

weather, but of nature taken as a whole. It is only by investigating the latter that we shall be able to forecast the weather for centuries to come.

Nor is it possible to prospect for minerals by basing your efforts on an empirical foundation. In doing so we can only maim the earth rather than untap its colossal resources.

In a word, the investigation of the interrelations between different branches of science is one of the major tasks facing the scholar of today. There are such people capable of achieving this task in this country. But there will be still more of them if there is a demand for their talents. Presently on the staff of many scientific establishments, these people have almost no chance to fulfil themselves in such a capacity. Labelled by those around them as eccentrics and dreamers, they tend to find a vent for their energies by working in various voluntary scientific organizations, and by conducting occasional experiments at their own homes. In fact, they are the right people to promote science. What's needed here is to make use of their enthusiasm on a state basis.

[Question] In other words, what we need here is a social order for talented inventors, don't we?

[Answer] Yes. The way to achieve this has already been outlined. What I have in mind is the top-priority objectives set by the Party to boost scientific and technical progress. They must be tackled by taking into account the human factor. And it will not be long before the people the science needs so much, emerge.

[Question] What is the fate of unique ideas today?

As a rule, their fate is an unhappy one. A rather washed-out system of criteria as to what in science should be considered scientific and what should not prove to be a major drag. To make matters worse, the authority of practice often tends to be neglected to please the authority of this or that person. This point was made very clear by Soviet scientologist V. Nalimov, who says that a scholar ought to be able to make his ideas public even when they have not been proved and go contrary to the established ways of today. For a scientific hypothesis at the moment of its inception is to a certain degree a speculation. The fact that it proves to be short-lived does not necessarily imply that it is useless. It stirs scientists to ponder further on it and thus leads on to new ideas and arguments.

A Leader's Ethics

[Question] We are talking about the human factor in science. But there are quite a few ideas that are generated by people on a production line, with their "labours" being sometimes very strenuous and lacking the support of the collective. Many an innovation of a practical value has been surrounded by almost insurmountable barriers. How can you explain such conservatism?

[Answer] What is behind the "barriers" is an in-depth natural phenomenon that has been noticed by psychologists and is related to the problem of the social

unacceptability of new things. Any innovation entails change in this or that aspect of people's life. For instance, it can result in a higher accuracy, or tougher work schedule. To complicate matters still further the implementation of new ideas often involves some risk. Is the risk involved worthwhile to those who are only too glad to retain what they have achieved by avoiding any possible negative results? That is where the protective mechanism in many people comes into play.

[Question] No innovator and his leader are known to see eye to eye for the sheer reason that the latter can for some time do without this innovation. What would you advise to a leader who has been approached about a new, or for that matter, risky proposal?

[Answer] In this case the observation of work ethics results in an immediate economic effect. When discussing an innovation the leader tends to proceed from its usefulness. Notwithstanding this, about one-third (27 per cent) of all the proposals on the introduction of new ideas is turned down on the sole ground that a person who is not pleasant in some of his ways has nothing to offer for production. From this proceeds one of the first rules of work ethics: "Be objective in appraising proposals put forward by people you do not like".

Sometimes a person quite sincerely wished to improve things, but failed to find an acceptable solution and was given the cold shoulder. This is true of every third innovation submitted for consideration. As a result of it, the initiative peters out and many people who would like in the future to come out with a proposal are somehow turned off. Here is another rule in this connection: "Be attentive and objective to a seemingly useless proposal".

[Question] Experience shows that the methods of "non-implementation" have been mastered. But then how should a leader willing to introduce new things but unable to find support among his group, act?

[Answer] Getting things ready for introduction should not be confined to organizational and technological measures only. The analysis of failures of this type shows that in many cases they have resulted from neglecting things psychological. In the first place, a system to inform the staff of the forthcoming restructuring should be elaborated. To put it simply, the objective of the innovations to be introduced will have to be made clear to people with an eye on their psychological idiosyncrasies. A person must be given as much information as he can digest at any one time. Otherwise, instead of encouraging a member of the workforce, it will discourage him from any activity by overwhelming him with the depressing enormity of the tasks.

[Question] You mean the first thing to do is to prepare people?

[Answer] Exactly! I know of a case when a certain technology was introduced in one of the factories, which resulted in better working conditions. Some time later almost half of the employees wanted to quit their jobs. The management appeared to have foreseen everything, including in-work training, but had forgotten completely about psychological preparation. Hence, those who were accustomed to use a creative approach in their work quit when they

saw that their work had become easier but less interesting. That is why one of the principles of preparing people psychologically for introducing innovations requires that the leader know all the staff members in terms of their approach to new things. It is necessary to know both innovators, enthusiasts and conservatives, retrospectives and neutrals.

[Question] Such a difference in psychologies must be of a biological nature. Innovators and retrospectives have always existed and most likely will always exist. But how is it possible to get both of them to work for scientific and technical progress?

[Answer] There is an age-old practical observation which has been borne out by serious socio-psychological investigations to the effect that it is only the leader who can back up creators and their creations that is capable of creating new things. Much can be accomplished by the leader-innovator who is consistent in forming a positive attitude towards innovations in his collective.

[Question] This goal requires special knowledge and skills, doesn't it? It it always the case?

[Answer] One cannot possibly expect any good results if the socio-psychological basis for the introduction of innovations is not backed up organizationally.

IT IS HIGH TIME PSYCHOLOGICAL SERVICES WERE SET UP AT FACTORIES, IN BRANCHES AND FINALLY IN THE WHOLE NATIONAL ECONOMY. ONE OF THEIR FUNCTIONS MUST BE TO PAVE THE WAY FOR INNOVATIONS TO BE INTRODUCED, AS WELL AS TO SELECT AND DISTRIBUTE PERSONNEL FOR THAT PURPOSE [in boldface].

Some experience has already been accumulated in this country. For instance, the Kurganpribor association has a psychological service now in operation. It was set up by its general director, Ye. Tarasov, himself a Candidate of Science (Psychology). As a result labour fluctuation at the enterprise has been reduced and labour productivity considerably increased.

Unfortunately, these instances are rare indeed. This is due to the syllabus in technical institutes which train future production leaders having no course in social psychology. The necessity to call the attention of specialists to these issues is ripe. As we have said earlier, the decisive factor in effecting changes is man himself, his outlook and psychology. The answers to my questions, the alphas and omegas of many yet unsolved problems, must be sought in him.

7807
CSO: 1814/27

END

END OF FICHE

DATE FILMED

♣ 17 MARCH 86 ♣

3/17